

Operating Manual

Version 1.0.9

Geared drill

OPTi drill®
DH 45V Part no. 3034263



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1 Delivery, interdepartmental transport, assembly and commissioning

1.1 Notes on transport, installation, commissioning

Improper transport, installation and commissioning is liable to accidents and can cause damage or malfunctions to the machine for which we do not assume any liability or guarantee.

Transport the scope of delivery secured against shifting or tilting with a sufficiently dimensioned industrial truck or a crane to the installation site.

WARNING!

Severe or fatal injuries may occur if parts of the machine tumble or fall down from the forklift truck or from the transport vehicle. Follow the instructions and information on the transport box.

Note the total weight of the machine. The weight of the machine is indicated in the "Technical data" of the machine. When the machine is unpacked, the weight of the machine can also be read on the rating plate.

Only use transport devices and load suspension gear that can hold the total weight of the machine.



WARNING!

The use of unstable lifting and load suspension equipment that might break under load can cause severe injuries or even death. Check that the lifting and load suspension gear has sufficient load-bearing capacity and that it is in perfect condition.

Observe the accident prevention regulations issued by your Employers Liability Insurance Association or other competent supervisory authority, responsible for your company. Fasten the loads properly.



1.1.1 General risks during internal transport

WARNING: TILTING DANGER!

The machine may be lifted unsecured by a maximum of 2 cm.

Employees must be outside the danger zone, i.e. the reach of the load.

Warn employees and advise them of the hazard.

Machines may only be transported by authorized and qualified persons. Act responsibly during transport and always consider the consequences. Refrain from daring and risky actions.

Gradients and descents (e.g. driveways, ramps and the like) are particularly dangerous. If such passages are unavoidable, special caution is required.

Before starting the transport check the transport route for possible danger points, unevenness and faults.

Danger points, unevenness and disturbance points must be inspected before transport. The removal of danger spots, disturbances and unevenness at the time of transport by other employees leads to considerable dangers.

Careful planning of interdepartmental transport is therefore essential.



Preface

Dear customer,

Thank you very much for purchasing a product made by OPTIMUM.

OPTIMUM metal working machines offer a maximum of quality, technically optimum solutions and convince by an outstanding price performance ratio. Continuous enhancements and product innovations guarantee state-of-the-art products and safety at any time.

Before commissioning the machine please thoroughly read these operating instructions and get familiar with the machine. Please also make sure that all persons operating the machine have read and understood the operating instructions beforehand.

Keep these operating instructions in a safe place nearby the machine.

Information

The operating instructions include indications for safety-relevant and proper installation, operation and maintenance of the machine. The continuous observance of all notes included in this manual guarantee the safety of persons and of the machine.

The manual determines the intended use of the machine and includes all necessary information for its economic operation as well as its long service life.

In the paragraph "Maintenance" all maintenance works and functional tests are described which the operator must perform in regular intervals.

The illustration and information included in the present manual can possibly deviate from the current state of construction of your machine. Being the manufacturer we are continuously seeking for improvements and renewal of the products. Therefore, changes might be performed without prior notice. The illustrations of the machine may be different from the illustrations in these instructions with regard to a few details. However, this does not have any influence on the operability of the machine.

Therefore, no claims may be derived from the indications and descriptions. Changes and errors are reserved!

Your suggestion with regard to these operating instructions are an important contribution to optimising our work which we offer to our customers. For any questions or suggestions for improvement, please do not hesitate to contact our service department.

If you have any further questions after reading these operating instructions and you are not able to solve your problem with a help of these operating instructions, please contact your specialised dealer or directly the company OPTIMUM.

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2 Safety

Glossary of symbols

▶	provides further instructions
→	calls on you to act
□	listings

This part of the operating instructions

- explains the meaning and use of the warning notes included in these operating instructions,
- defines the intended use of the geared drill,
- points out the dangers that might arise for you or others if these instructions are not observed,
- informs you about how to avoid dangers.

In addition to these operation instructions, please observe

- the applicable laws and regulations,
- the statutory provisions for accident prevention,
- the prohibition, warning and mandatory signs as well as the warning notes on the geared drill.

Always keep this documentation close to the geared drill.

INFORMATION

If you are unable to rectify an issue using these operating instructions, please contact us for advice:

Optimum Maschinen Germany GmbH
Dr. Robert-Pfleger-Str. 26
D-96103 Hallstadt, Germany
Email: info@optimum-maschinen.de



2.1 Safety instructions (warning notes)

2.1.1 Classification of hazards

We classify the safety warnings into different categories. The table below gives an overview of the classification of symbols (ideogram) and the warning signs for each specific danger and its (possible) consequences.

Symbol	Alarm expression	Definition / consequence
	DANGER!	Impending danger that will cause serious injury or death to people.
	WARNING!	A danger that can cause serious injury or death.
	CAUTION!	A danger or unsafe procedure that can cause personal injury or damage to property.
	ATTENTION!	Situation that could cause damage to the geared drill and product, as well as other types of damage. No risk of injury to persons.

DH45V_GB_1.fm

Symbol	Alarm expression	Definition / consequence
	Information	Practical tips and other important or useful information and notes. No dangerous or harmful consequences for people or objects.

In case of specific dangers, we replace the pictogram with



general danger



with a warning of



injury to hands,



hazardous
electrical voltage,

or



rotating parts.

2.1.2 Other pictograms



Warning: danger of
slipping!



Warning: risk of stumbling!



Warning: hot surface!



Warning: biological hazard!



Warning: automatic start-
up!



Warning: tilting danger!



Warning: suspended loads!



Caution, danger of
explosive substances!



Switching on forbidden!



Do not climb onto the
machine!



Read the operating
instructions before
commissioning!



Pull out the mains plug!



Wear protective glasses!



Wear protective gloves!



Wear safety shoes!



Wear a protective suit!



Use ear protection!



Only switch during
standstill!



Protect the environment!



Contact address

2.2 Intended use

WARNING!

In the event of improper use of the geared drill

- will endanger personnel,
- will endanger the machine and other material property of the operating company,

the correct function of the geared drill may be affected.

The geared drill is designed and manufactured to be used in a non-explosive environment. The geared drill is designed and manufactured for holes in cold metals or other non flammable materials or that not constitute a health hazard using a rotating filing-stripping tool that has a number of grooves for collecting the filings.

If the geared drill is used in any way other than described above, modified without authorization of Optimum Maschinen Germany GmbH, then the geared drill is being used improperly.

We will not be held liable for any damages resulting from any operation which is not in accordance with the intended use.

We expressly point out that the guarantee will expire, if any constructive, technical or procedural changes are not performed by the company Optimum Maschinen Germany GmbH.

It is also part of the intended use that you

- observe the limits of the geared drill,
- the operating manual is observed,
- the inspection and maintenance instructions are observed.

► Technical specification on page 17



WARNING!

Extremely severe injuries.

It is forbidden to make any modifications or alternations to the operation values of the geared drill! They could endanger the personnel and cause damage to the geared drill.



2.3 Reasonably foreseeable misuse

Any use other than that specified under "Intended use" or any use beyond that described will be deemed non-intended use and is not permissible.

Any other use has to be discussed with the manufacturer.

It is only allowed to process metal, cold and non-inflammable materials with the geared drill.

In order to avoid misuse, it is necessary to read and understand the operating instructions before first commissioning.

Operators must be qualified.

2.3.1 Avoiding misuse

CAUTION!

This machine is intended for commercial use and complies with EMC category C2.

This machine with a frequency converter causes high-frequency interference that may require additional interference suppression measures in residential environments.

This machine is therefore not subject to the requirements of the EN 61000-3-2 standard for the emission of harmonics.

It is recommended to regularly check the signal lines to the frequency converter for correct earthing of the shielding.

The programmed standard pulse frequency must not be reprogrammed by the user.



Overview of the EMC categories:

Category C1

- required limit values Class B Group 1 according to EN 55011

Category C2

- Required limit values class A Group 1 according to EN 55011, Installation by EMC experts and warning: "This is a product of category C2 according to EN 61800-3. This product may cause radio interference in a residential area. In this case, it may be necessary for the operator to take appropriate action."

Category C3

- Required limit values class A group 2 according to EN 55011, whereby these limit values are below those of class A group 1, plus warning: "This type is not suitable for connection to a public low-voltage network supplying residential buildings. When connecting to a public low voltage network, radio frequency interference is expected."

This machine	☐	☒	☐	☐
Category	C1	C2	C3	C4
Environment	Residential area Business area Industrial area		Industrial area	
Voltage / Current	< 1000 V			> 1000 V
EMC knowledge	no requirement	Installation and commissioning by an EMC expert		

- Use of suitable cutting tools.
- Adapting the speed setting and feed to the material and workpiece.
- Clamp workpieces firmly and free of vibration.

ATTENTION!

The workpiece is always to be fixed by a machine vice, jaw chuck or by another appropriate clamping tool such as for the clamping claws.



WARNING!

Risk of injury caused by flying workpieces.

Clamp the workpiece in the machine vice. Make sure that the workpiece is firmly clamped in the machine vice and that the machine vice is firmly clamped onto the machine table.



- Use cooling and lubricating agents to increase the durability of the tool and to improve the surface quality.
- Clamp the cutting tools and workpieces on clean clamping surfaces.
- Sufficiently lubricate the machine.
- Set the bearing clearance and guides correctly.

Recommendations:

- Insert the drill in a way that it is exactly positioned between the three clamping jaws of the quick action chuck.

When drilling, make sure that

- the suitable speed is set depending on the diameter of the drill,
- the pressure must only be such that the drill can cut without load,

- if there is too much pressure, the drill will wear quickly and may even break or jam in the borehole. If the drill jams, immediately stop the main motor by pressing the emergency stop button,
- use commercial cooling/lubricating agents for hard materials, e.g. steel and

2.4 Possible dangers caused by the geared drill

The geared drill was built using state-of-the-art technology.

Nevertheless, there is a residual risk as the geared drill operates with

- high speeds,
- rotating parts,
- electrical voltage and currents.

We have used design and safety engineering to minimize the health risk to personnel resulting from these hazards.

If the geared drill is used and maintained by personnel who are not duly qualified, there may be a risk resulting from incorrect or unsuitable maintenance of the geared drill.

INFORMATION

Everyone involved in the assembly, commissioning, operation and maintenance must

- be duly qualified,
- and strictly follow these operating instructions.

In the event of improper use

- there may be a risk to personnel,
- there may be a risk to the machine and other material values,
- the correct function of the geared drill may be affected.

Always disconnect the geared drill if cleaning or maintenance work is being carried out, or is no longer in use.



WARNING!

The geared drill may only be operated with functional safety devices.

Disconnect the geared drill immediately, whenever you detect a failure in the safety devices or when they are not fitted!

All additional devices installed by the operator must be equipped with the stipulated safety devices. This is your responsibility being the operating company!

► Safety devices on page 12



2.5 Qualification of personnel

2.5.1 Target group

This manual is addressed to

- the operating companies,
- the operators,
- the maintenance personnel.

Therefore, the warning notes refer to both, operation and maintenance personnel of the geared drill.

Determine clearly and explicitly who will be responsible for the different activities on the machine (operation, maintenance and repair).

Unclear responsibilities constitute a safety risk!

The qualifications of the personnel for the different tasks are mentioned below:

Operator

The operator is instructed by the operating company about the assigned tasks and possible risks in case of improper behaviour. The operator may only carry out tasks that exceed normal operation if this is stated in these instructions and the operating company has explicitly entrusted him with the task.

Qualified electrician

With professional training, knowledge and experience as well as knowledge of respective standards and regulations, qualified electricians are able to perform work on the electrical system and recognise and avoid any possible dangers.

Qualified electricians have been specially trained for the working environment, in which they are working and know the relevant standards and regulations.

Qualified personnel

Due to their professional training, knowledge and experience as well as knowledge of relevant regulations, qualified personnel are able to perform the assigned tasks and to independently recognise and avoid any possible dangers.

Instructed person

Instructed persons were instructed by the operating company regarding the assigned tasks and any possible risks of improper behaviour.

2.5.2 Authorized persons

WARNING!

Inappropriate operation and maintenance of the geared drill constitutes a danger for the personnel, objects and the environment.



Only authorized personnel may operate the geared drill !

Authorized operating and maintenance personnel are specialists instructed and trained by the operator and the manufacturer.

Obligations of the operating company

- ☐ train the personnel,
- ☐ instruct the personnel in regular intervals (at least once a year) on
 - all safety regulations relevant to the machine,
 - its operation and
 - generally accepted engineering standards.
- ☐ check the personnel's knowledge level,
- ☐ document the training/instruction,
- ☐ have attendance at the training/instruction confirmed by signature and
- ☐ check whether the personnel is working in a safety and risk-conscious manner and following the operating instructions.
- ☐ define and document the inspection deadlines for the machine in accordance with § 3 of the Factory Safety Act and perform an operational risk analysis in accordance with § 6 of the Work Safety Act.

Obligations of the operator

- ☐ have obtained a training regarding the handling of the geared drill,
- ☐ know the function and mode of action,
- ☐ before taking the machine in operation
 - have read and understood the operating manual,
 - be familiar with all safety devices and instructions.

Additional requirements apply for work on the following machine components:

Additional requirements regarding the qualification

- Electrical parts or operating agents: shall only be performed by an electrician or under the guidance and supervision of an electrician.
- Before starting work on electrical parts or operating agents, the following actions must be taken in the order given:
 - disconnect all poles,
 - secure against restarting,
 - check that there is no voltage.

2.6 User positions

The operator position is in front of the geared drill.

2.7 Safety measures during operation

CAUTION!

Danger due to inhaling dust and mist that are hazardous to health.

Depending on the materials to be machined and the agents used, dusts and mists can arise that are detrimental to health.

Ensure that the harmful dust and mist generated are safely sucked off at the point of origin and routed away from the working area or filtered. To do so, use a suitable extraction unit.



CAUTION!

Risk of fire and explosion by using flammable materials or cooling lubricants.

Extra precautionary measures must be taken before machining flammable materials (e.g. aluminium, magnesium) or using combustible agents (e.g. spirit) to avert a health hazard.



2.8 Safety devices

Use the geared drill only with properly functioning safety devices.

Stop the geared drill immediately, if a safety device fails or is faulty or becomes ineffective.

It is your responsibility!

If a safety device has been activated or has failed, the geared drill must only be used if you

- the cause of the fault has been eliminated,
- you have verified that there is no danger to personnel or objects.

WARNING!

If you bypass, remove or deactivate a safety device in any other way, you are endangering yourself and other personnel working with the geared drill. The possible consequences are

- injuries due to components or workpieces flying off at high speed,
- contact with rotating parts,
- fatal electrocution,



The geared drill includes the following safety devices:

- an emergency stop push button,
- a drilling table with T-slots to fix the workpiece or a vice,
- a drill chuck guard, in order to prevent interference with the rotating tool.

INFORMATION

The machine cannot be started, if the drill chuck guard is not closed and the locking pin of integrated drill drift is in drifting position.



WARNING!

Although the isolating safety devices provided and delivered with the machine are designed to reduce the risks of workpieces being ejected or parts of tools or workpieces breaking off, they cannot eliminate these risks completely. Always work carefully and observe the limits of the machining process.



2.9 Safety check

Check the geared drill before each start-up or at least once per shift. Inform the person responsible immediately of any damage, defects or changes in the operating function.

Check all safety devices

- ☐ at the beginning of each shift (with the machine stopped),
- ☐ once a week (with the machine in operation) and
- ☐ after all maintenance and repair work.

Check that prohibition, warning and information signs and the labels on the geared drill

- ☐ are legible (clean them, if necessary)
- ☐ are complete (replace if necessary).

INFORMATION

Organise the checks according to the following table;



General check		
Equipment	Check	OK
Guards	Mounted, firmly bolted and not damaged	
Signs, Markers	Installed and legible	
Date:	Checked by (signature):	

Functional check		
Equipment	Check	OK
Emergency stop button	After the emergency stop button is pressed, the drilling machine must switch off.	
Drill chuck guard	The drilling machine may only switch on, if the drill chuck guard is closed. The engine must switch off when the drill chuck guard is opened during operation.	
Date:	Checked by (signature):	

2.10 Emergency stop button

CAUTION!

The drilling spindle keeps turning for a short time even after actuating the emergency stop push button depending on the preset speed.



2.10.1 Master switch

In the "0" position, the lockable main switch can be secured against accidental or non-authorised switching on by means of a padlock.

The power supply is cut off when the master switch is in the off position.

Except for the areas marked by the pictogram in the margin. In these areas there might be voltage, even if the main switch is switched-off.

WARNING!

Dangerous voltage even if the main switch is switched off.

The areas marked by the pictogram might contain live parts, even if the master switch is switched off.



2.10.2 Drill chuck guard

Adjust the guard to the correct height before you start working.

To do so, slacken the clamping screw, set the required height and re-tighten the clamping screw.

There is a switch integrated in the spindle protection mounting which monitors the closed position.

INFORMATION

The machine cannot be started, if the drill chuck guard is not closed and the locking pin of integrated drill drift is in drifting position.



2.11 Personal protective equipment

For some works you need personnel protective equipment as protective equipment. These are

- ☐ Safety helmet,
- ☐ protective glasses or face guard,
- ☐ protective gloves,
- ☐ safety shoes with steel toe caps,
- ☐ ear protection.

Before starting work make sure that the required personnel protective equipment is available at the work place.

CAUTION!

Dirty or contaminated personnel protective equipment can cause illness.

Clean your personal protective equipment

- ☐ after each use,
- ☐ regularly once a week.

Personal protective equipment for special works

Protect your face and your eyes: Wear a safety helmet with facial protection when performing work where your face and eyes are exposed to hazards.

Wear protective gloves when handling pieces with sharp edges.

Wear safety shoes when you assemble, disassemble or transport heavy components.



2.12 Safety during operation

We provide information about the specific dangers when working with and on the geared drill in the descriptions for these types of work.

WARNING!

Before switching on the geared drill make sure that there are

- ☐ no dangers generated for persons,
- ☐ no objects are damaged.



Avoid any unsafe work methods:

- Make sure that your operation does not create a safety hazard.
- The rules specified in these operating instructions must be observed during assembly, operation, maintenance and repair.
- Do not work on the geared drill if your concentration is reduced, for example, because you are taking medication.
- Observe the accident prevention regulations issued by your Employers Liability Insurance Association or other supervisory authorities applicable to your company.
- Inform the supervisor about all hazards or faults.
- Stay on the geared drill until the machine completely stopped moving.
- Use the specified personal protective equipment. Ensure you wear close-fitting clothing and, if necessary, a hairnet.
- Do not use protective gloves when drilling.

2.13 Safety during maintenance

Inform the operators in good time of any maintenance and repair works.

Report all safety relevant changes and performance details of the geared drill or their operational behavior. Any changes must be documented, the operating instructions updated and machine operators instructed accordingly.

2.13.1 Disconnecting and securing the geared drill

Switch off the geared drill with the main switch and secure the main switch with a padlock against unauthorised switching-on or switching-on by accident.

All machine parts as well as all dangerous voltages are switched off. Excepted are only the positions which are marked with the adjoining pictogram.



2.14 Using lifting equipment

WARNING!

The use of unstable lifting and load suspension equipment that might break under load can cause severe injuries or even death.

Check that the lifting and load suspension gear

- they have sufficient load carrying,
- and that it is in perfect condition.

Observe the accident prevention regulations issued by your Employers Liability Insurance Association or other supervisory authorities applicable to your company.

Fasten the loads carefully. Never walk under suspended loads!



2.14.1 Mechanical maintenance

Reinstall all protection and safety devices after any maintenance work once the work has been completed. This includes:

- covers,
- safety instructions and warning signs,
- grounding cables.

Check if they are working properly!

2.15 Accident report

Inform your supervisors and Optimum Maschinen Germany GmbH immediately in the event of accidents, possible sources of danger and any actions which almost led to an accident (near misses).

There are many possible causes for "near misses".

The sooner they are notified, the quicker the causes can be eliminated.

2.16 Electronics

Have the machine and/or the electric equipment checked regularly. Immediately eliminate all defects such as loose connections, defective wires, etc.

A second person must be present during work on live components to disconnect the power in the event of an emergency. Disconnect the machine immediately if there is a malfunction in the power supply!

Comply with the required inspection intervals in accordance with the factory safety directive, operating equipment inspection.

The operator of the machine must ensure that the electrical systems and operating equipment are inspected with regards to their proper condition, namely,

- by a qualified electrician or under the supervision and direction of a qualified electrician, prior to initial commissioning and after modifications or repairs, prior to recommissioning
- and at set intervals.

The intervals must be set so that foreseeable defects can be detected in a timely manner, when they occur.

The relevant electro-technical rules must be followed during the inspection.

The inspection prior to initial commissioning is not required if the operator receives confirmation from the manufacturer or installer that the electrical systems and operating equipment comply with the accident prevention regulations, see conformity declaration.

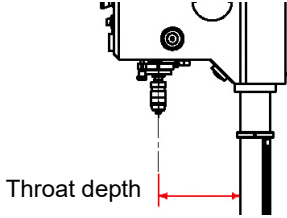
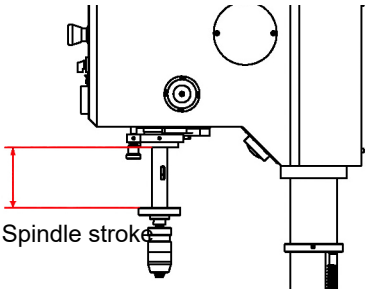
Permanently installed electrical systems and operating equipment are considered constantly monitored if they are continually serviced by qualified electricians and inspected by means of measurements in the scope of operation (e.g. monitoring the insulation resistance).

2.17 Inspection deadlines

Define and document the inspection deadlines for the machine in accordance with § 3 of the Factory Safety Act and perform an operational risk analysis in accordance with § 6 of the Work Safety Act. Also use the inspection intervals in the maintenance section as reference values.

3 Technical specification

The following information represents the dimensions and indications of weight and the manufacturer's approved machine data.

	DH45V
Electrical connection	400 V / 3 Ph ~50 Hz (~ 60Hz)
Spindle drive motor power	2.2 kW
Coolant pump motor power	100 W
Drilling capacity in steel (S235JR) [mm]	Ø 40
Tapping in steel (S235JR) [mm]	M 30
 Throat depth	350 mm
 Spindle stroke	170 mm
Spindle seat	MT4
Table size Length x Width of the working surface	530 x 530 mm
Bearing load drilling table [kg]	250
Tilting the table to the side	0 - 90°
Drilling table rotate	360°
T-slot thread size / distance / number	M16 (18mm) / 125 mm / 3
Distance spindle - table [mm]	100 - 740 mm
Maximum distance [mm] spindle - stand	1210
Dimensions of the machine	► Dimensions on page 19
Required space	Keep a work area of at least one metre around the machine free for operation and maintenance.
Machine weight [kg]	515
Spindle speeds [rpm]	► Speed on page 31
Column diameter [mm]	Ø 150 mm

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	DH45V
Environmental conditions temperature	5 - 35 °C
Environmental conditions Relative humidity	25-80%
Gear operating material	3 litres Mobilgear 629 ► Lubricant on page 64
Operating material Toothed rod and drill column	acid-free oil
Coolant system	max. 5 liters ► Lubricant on page 64

3.1 Emissions

CAUTION!

The user must wear noise protection and hearing protection.

The A-weighted sound pressure level L_{pA} is 84 to 87 dB.

The A-weighted sound power level L_{WA} is 99 to 103 dB.



INFORMATION

This numerical value was measured on a new machine under the operating conditions specified by the manufacturer. The noise behaviour of the machine might change depending on the age and wear of the machine.

Furthermore, the noise emission also depends on production engineering factors, e.g. speed, material and clamping conditions.



INFORMATION

The following factors influence the actual degree of the noise exposure of the operator:

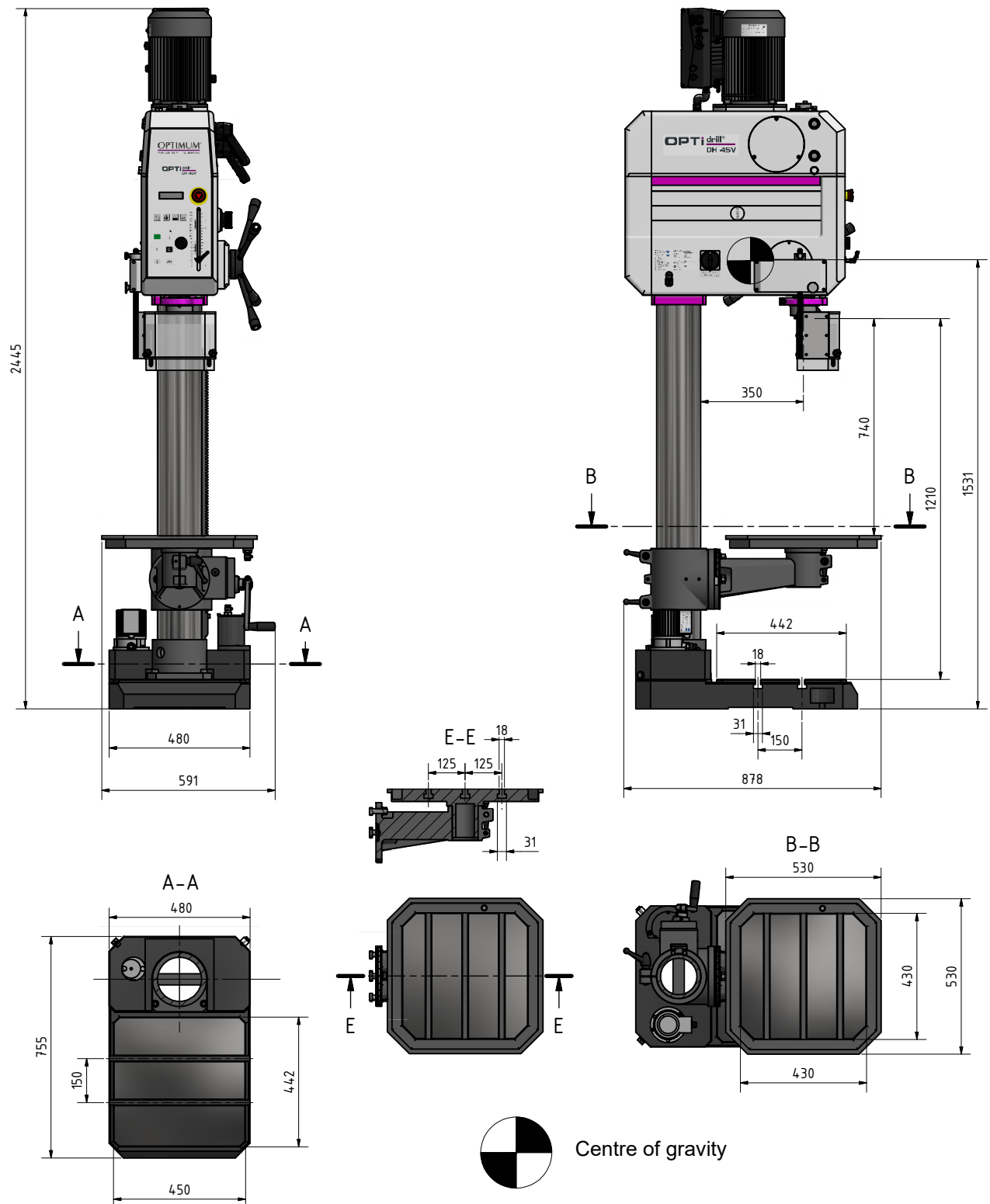
- **Characteristics of the working area, e.g. size or damping behaviour,**
- other noise sources, e.g. the number of machines,
- other processes taking place in proximity and the period of time, during which the operator is exposed to the noise.

Furthermore, it is possible that the admissible exposure level might be different from country to country due to national regulations.

This information about the noise emission should, however, allow the operator of the machine to more easily evaluate the hazards and risks.



3.2 Dimensions



3.3 Delivery

INFORMATION

The machine is pre assembled. It is delivered in a transport box. After the unpacking and the transportation to the installation site it is necessary to mount and assemble the individual components of the machine.



Check the status of the machine immediately upon receipt and claim possible damages at the last carrier also if the packing is not being damaged. In order to ensure claims towards the freight carrier we recommend you to leave the machines, devices and packing material for the time being in the status at which you have determined the damage or to take photos of this status. Please inform us about any other claims within six days after receipt of delivery.

Check if all parts are firmly seated.

3.4 Unpacking

Install the machine close to its final position before unpacking. If the packaging shows signs of having possibly been damaged during transport, take the appropriate precautions to prevent the machine being damaged when unpacking. If damage is discovered, the carrier and/or shipper must be notified immediately so the necessary steps can be taken to register a complaint.

Examine the complete machine carefully and check whether all materials, such as shipping documents, instructions and accessories have been delivered with the machine.

3.5 Lifting the machine

- Reclining transport. Dismantle the side parts of the box.
- Dismantle the fortifications in the box.
- Fit a steel rod 30 mm x approx. 600 mm through the hole in the drill head. Pull up the machine with a suitable lifting device from the box, and set up the machine on the floor.



3.6 Installation requirements

Organise the working area around the machine according to the local safety regulations. The work area for operation, maintenance and repair must not be restrictive.

- Follow the prescribed safety areas and escape routes according to VDE 0100 part 729 as well as the environmental conditions for the operation of the machine.
- The main switch of the machine must be freely accessible.
- The machine must only be installed and operated in a dry and well-ventilated place.
- Avoid places near machines generating chips or dust.
- The installation site must be free from vibrations also at a distance of presses, planing machines, etc.
- Provide sufficient space for the personnel preparing and operating the machine and transporting the material.
- Also make sure the machine is accessible for setting and maintenance works.

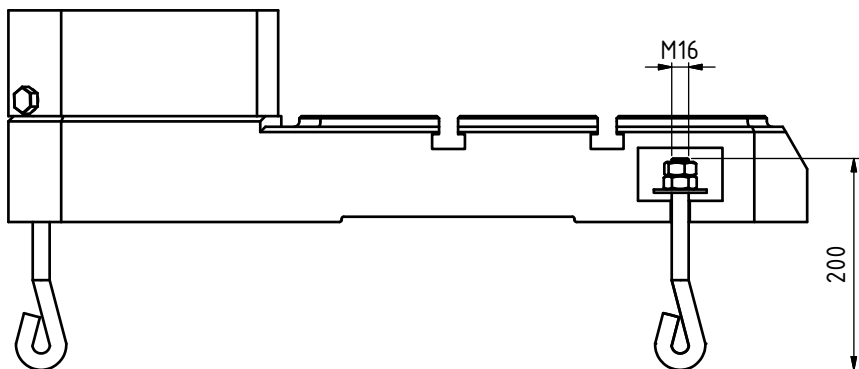
3.6.1 Foundation and ground

- Check the ground. The ground must bear the load.
- The substructure must be prepared in such a way as to ensure that, if any lubricant is used, it cannot penetrate the floor.

3.7 Fixing

In order to provide for the necessary stability of the geared drill, it is necessary to firmly connect the geared drill with its foot to the ground. We recommend the use of anchor rods DIN 529 M16 x 200

- Fix the foot of the geared drill to the ground with the holes pre-drilled for this purpose.



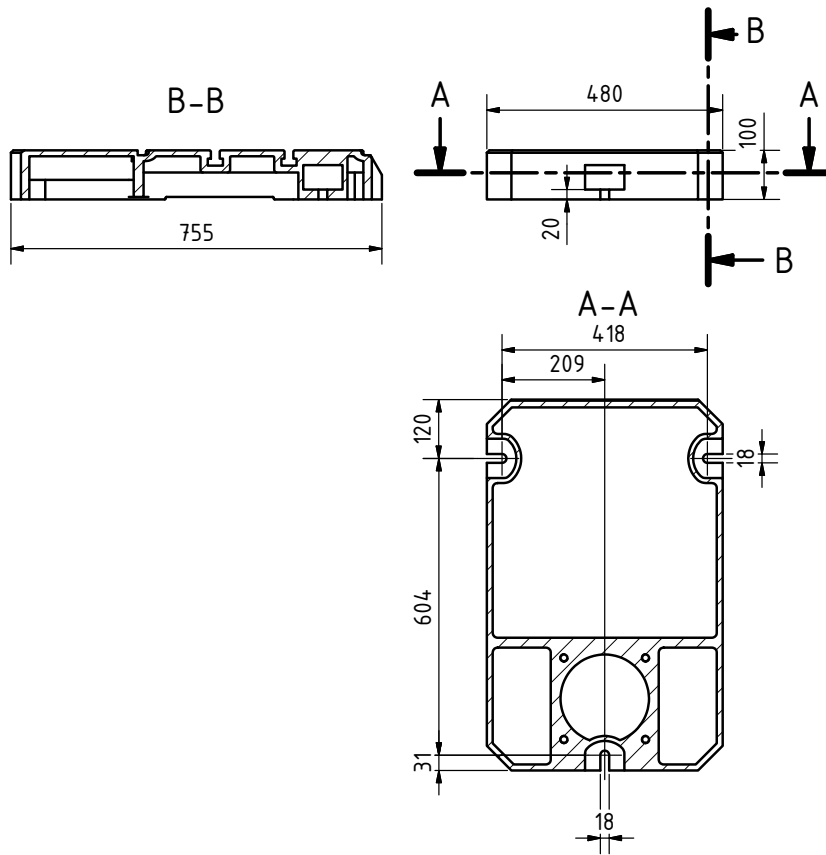
ATTENTION!

Tighten the fixing screws of the geared drill only as much that it is safely fixed and cannot break away or tilt over.

If the fixing screws are too tight in particular in connection with an uneven substructure it may result in a broken stand of the machine.



3.7.1 Assembly drawing



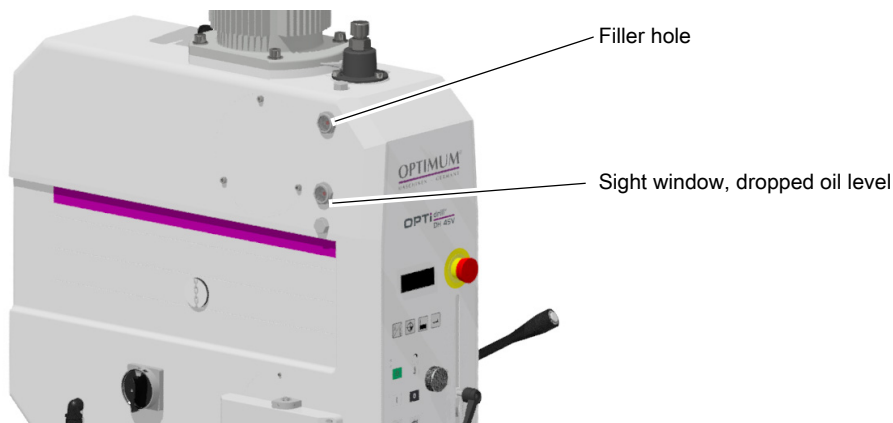
3.8 Lubrication

With the first lubrication and greasing your new machine, oil in the gear and the coolant system is filled. Once these operations have been carried out, the machine can be started up.

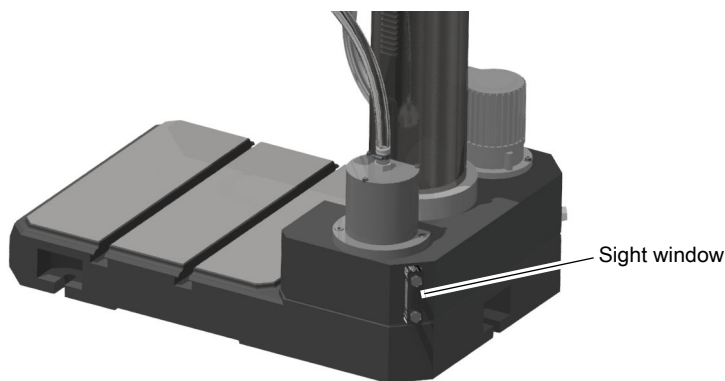
- The oil tank of the gearbox must be filled to half way up the sight glass. Filling quantity about 3 liters.
- The oil must be changed 200 hours after being filled for the first time, then after every 2000 operating hours.
- Use the oil types recommended in the reference table
 - Lubricant on page 64. This table can be used to compare the characteristics of each different type of oil of your choice.
- The coolant tank must be filled to half way up the sight glass. Filling quantity about 4 liters. Fill the coolant tank over the drilling table.



3.8.1 Gear



3.8.2 Coolant equipment



3.9 First commissioning

CAUTION!

First commissioning may only take place after proper installation.

WARNING!

The use of improper tool holders or their operation at inadmissible speeds constitutes a hazard. Only use the tool holders (e.g. drill chuck) which were delivered with the machine or which are offered as optional equipment by OPTIMUM.

Only use tool holders in the intended admissible speed range.

Tool holders may only be modified in compliance with the recommendation of OPTIMUM or of the manufacturer of the clamping devices.

WARNING!

There is a danger to persons and equipment, if the first commissioning of the geared drill is carried out by inexperienced personnel.

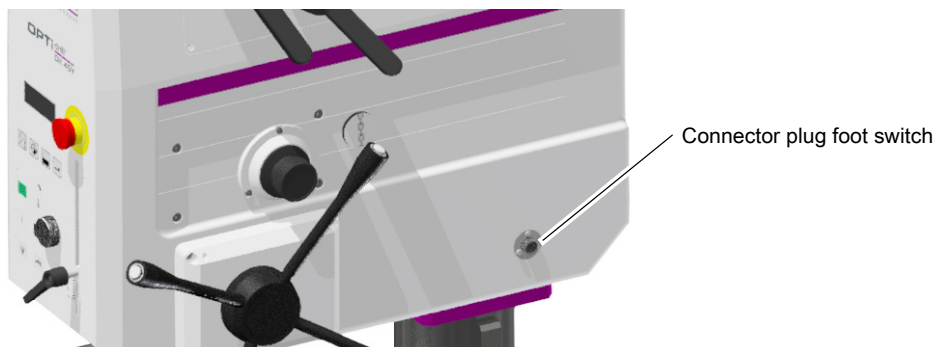
We do not accept any liability for damages caused by incorrectly performed commissioning. + „Qualification of personnel“ auf Seite 10



3.9.1 Connecting the optional foot switch

Floating contact for thread cutting.

The foot switch is used for reversing the direction of rotation for tapping, and can also be used to switch off the automatic spindle feed.



Img.3-1: Connector plug foot switch

→ Connect the foot switch to the connector.

INFORMATION

The connection cable has no polarity. The contact (2 wires) is designed as looped signal.



3.9.2 Warming up the machine

ATTENTION!

If the geared drill and in particular the drilling spindle is immediately operated at maximum load when it is cold it may result in damages.

If the machine is cold, e.g. directly after having transported the machine, it should be warmed up at a spindle speed of only 500 1/min for the first 30 minutes.



3.10 Electrical connection

CAUTION!

This machine is intended for commercial use and complies with EMC category C2.

The connection is therefore intended exclusively for industrial networks that are not fed directly from the public low-voltage network. If the machine is connected to a public low-voltage network, your power supply company must approve the electrical connection of the machine. For this purpose, contact your power supply company to obtain a connection permit.



INFORMATION

According to the definition of the EMC law, electromagnetic compatibility describes the "ability of a device to operate satisfactorily in the electromagnetic environment without itself causing electromagnetic disturbances that are unacceptable to other devices present in that environment". In order to comply with the relevant EMC standards, the equipment must, on the one hand, have a sufficiently high immunity to interference and, on the other hand, the emitted interference must be limited to tolerable levels.

The EMC requirements for "variable speed drive systems" are described in the product standard EN 61800-3



WARNING!

The three-phase electrical connection may only be performed by an electrician or under the guidance and supervision of an electrician.



CAUTION!

Arrange the machine's connection cable in such a way that it will not cause a tripping hazard.



ATTENTION!

Ensure that all 3 phases (L1, L2, L3) and the ground wire are connected correctly. The neutral conductor (N) of its power supply is not connected.



ATTENTION!

Observe the rotating field!

Please check that the type of current, voltage and protection fuse correspond to the values specified. A protective earth ground wire connection must be available.



→ Mains fuse 10A to 16A

IMPORTANT INFORMATION

The INVEOR frequency inverter may have touch currents of > 3.5 mA.

Therefore, a fixed earth connection is required and the minimum cross section of the protective earthing conductor must conform to local safety regulations for devices with high leakage current. This is achieved by providing a permanent fixed earthing connection with two independent conductors, each having a cross section the same as the power supply cord or greater.



Preferably, machines with frequency converters are therefore to be permanently connected to a terminal box, otherwise an additional fixed earth connection is required, which is not routed over the plug, and must correspond to at least the cross-section of the cable in the plug.

A second protective grounding conductor can be connected under the mains supply (position marked with a ground symbol) on the outside of the frequency inverter. A M6 x 12 screw (4.0 Nm torque) suitable for this connection is provided with the adapter plate.

ATTENTION!

If three-phase frequency converters are used, the use of conventional type A FI protection switches RCDs (residual current-operated protective devices) are not permissible as protection against direct or indirect contact.



According to DIN VDE 0160 and EN 50178, the FI protection switch must be universal current sensitive (RCD type B).

3.11 Power grid fluctuations and their destructive effect

A prerequisite for grid stability is that the frequency and voltage are within the specified limits at every location in the power grid and at all times. Excessive deviations in voltage can only be remedied locally, i.e. by nearby plants, while frequency deviations must be reacted to very quickly in particular. These measures to maintain grid stability are called system services of your supplier.

Lightning as a cause of voltage peaks

Thunderstorms, and the associated risk of lightning strikes, are one of the main causes of voltage peaks in electrotechnical installations. About 1.5 to 2 million lightning strikes per year are registered in Germany alone, and the damage is considerable. Destroyed equipment, damaged operating and data technology, failure of installations.

Switching of inductive loads

Switching inductive loads, supply company interference suppression and other problems also often damage data or systems.

Renewable energies

Renewable energies located in a local environment can trigger voltage fluctuations if the electricity grid operator is already operating the grid at the upper limit in order to be able to supply as much electricity as possible.

Detecting voltage peaks

In an electrical system, voltage peaks can be displayed with an oscilloscope or a mains analysis device; voltage peaks are thus made visible during long-term measurements. Measurements can also be made with a pulse counter, which records voltage peaks from a set threshold value using a measuring transformer. However, the significance of such measurements should be treated with caution. It is true that voltage peaks can be detected and can also be used for risk assessment. However, it is not the frequency of the voltage peaks that is decisive, but the destructive energy they contain. And a single impulse is enough to completely destroy a device.

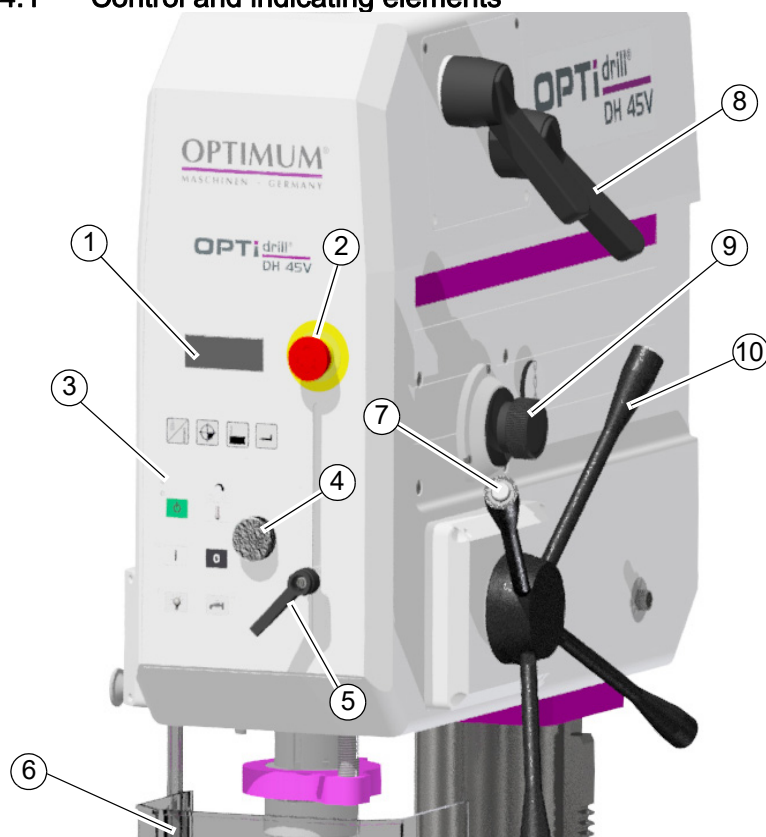
Detect and prevent over voltage

Impending over voltage damage must be recognised by a specialist and prevented by means of protection in the electrical system. Surge protection devices protect against short-term voltage peaks - so-called transients. Special TOV (Temporary Over Voltage) protection devices protect against temporary or permanent over voltages.

Voltage peaks with interference potential occur in every electrical system. Surges due to switching operations occur more frequently than lightning couplings. Voltage peaks can be detected by measurements, but only precautionary measures using a surge protection concept ensure the required high availability of an electrical system.

4 Operation

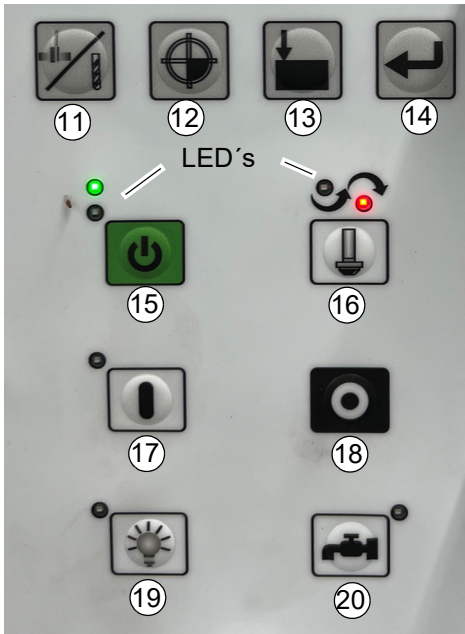
4.1 Control and indicating elements



Img.4-1: Control and indicating elements

Pos.	Designation	Pos.	Designation
1	Display Speed Drill depth Tapping depth Piece counter	2	Emergency stop switch
3	► Control panel on page 28	4	Speed adjustment
5	Mechanical drill depth clamping lever	6	Drill chuck guard
7	Feed push button	8	Speed gear lever
9	Feed selector	10	Spindle sleeve lever
Status displays on the inverter: ► Malfunctions on the frequency converter on page 68			

4.2 Control panel



Pos.	Designation
11	Selector switch drilling / tapping
12	Setting the zero point
13	Selector switch drill depth / tapping depth
14	Enter key
15	Push button control ON
16	Selector switch, direction of spindle rotation
17	Button spindle rotation ON
18	Spindle rotation button Off + Close menu
19	Machine illumination ON / OFF
20	Coolant pump ON / OFF

INFORMATION

Pay attention to the correct phase sequence for the electrical connection of the machine.

Incorrectly connected, or rotating in counter clockwise direction, the spindle sleeve feed does not switch on. The LED on control panel indicates the selected direction of rotation. The direction of rotation must correspond to the actual direction of rotation.



Push button control "On"



Turns on the control voltage. An illuminated LED indicates readiness for operation. Both LEDs must light up.

Push button ON



Turns the rotation of the drilling spindle on.

With start-up the spindle starts the rotation in a clockwise direction. A changing to "left-hand motion" (counter-clockwise) is only possible with rotating spindle.



Push button Off



Turns the rotation of the drilling spindle off.

Coolant pump ON / OFF



Switches the coolant pump.

Machine illumination ON / OFF



Switches the backlight on or off.

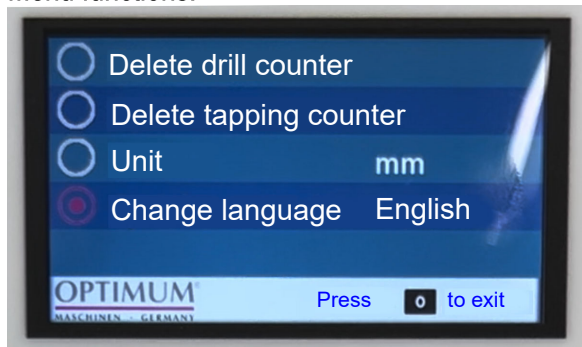
Main switch button

Interrupts or connects the power supply.

4.3 Display - Menu

- Press  to open the menu. Use the rotary knob for the speed setting to select the menu item. Press the enter key to change . Press the  button to exit the menu.

Menu functions:



- Delete drill counter - Delete number of holes
- Delete tapping counter - Delete number of threaded holes
- Unit - selection mm or inch
- Change language

4.3.1 Drilling depth / tapping depth

Mechanical drill depth stop

INFORMATION

In normal operation the clamping lever should be clamped in the upper position. If the clamp lever is in the lowest position, the automatic clutch is deactivated and can not be used.



The mechanical drill depth stop can be used when drilling several holes with the same depth. Use the electronic drill depth indicator in conjunction with the clamping lever.

- Release the clamping lever of the drill depth.
- Press the zero key  to set the electronic drilling depth display to zero.
- Move the spindle sleeve down to the desired depth and read the drilling depth display.
- Re-tighten the clamping lever.

4.3.2 Electronic drilling depth - Setting the signal tone

INFORMATION

The coupling for the feed is switched off when the switching point of the mechanical clamping lever or the electronic drilling depth is reached. Depending on which switching point is reached first.



In order to use the electronic depth setting.

- Close drill chuck protection.
- Press the drilling depth / tapping depth key . The symbol in the display flashes.
- As soon as the symbol flashes, the electronic depth can be set using the rotary knob for speed adjustment.
- If the acoustic signal is only to be active for the mechanical drilling depth stop, the depth must be set beyond the maximum possible quill travel.



4.4 Tapping / drilling mode

Push button tapping / drilling mode



In the tapping mode the engine automatically starts up according to a predefined path over the drilling depth display and automatically changes the turning direction as soon as the predefined depth had been achieved. The screw-tap is drawn out of the workpiece.

The automatic spindle feed in drilling mode is switched off according to a defined path via the drilling depth display.

4.5 Switching the machine on

INFORMATION

The machine cannot be started, if the drill chuck guard is not closed and the locking pin of integrated drill drift is in drifting position.



- Switch on the master switch.
- Select the gear stage
- Set the height of drill chuck guard and close the drill chuck guard.

→ Switch on the control voltage .

→ Press the push button  to turn on the spindle rotation.

4.6 Switching off the machine

CAUTION!

Only press the emergency-stop button in a genuine emergency. You should not use the emergency stop button to stop the machine during normal operation.



→ Actuate the push button .

→ For a long-term standstill of the machine switch it off at the master switch.

4.7 Speed

INFORMATION

Observe the range selection of the speed on speed table at the drilling head.



	B	C
I	90 - 525	30 - 165
II	420 - 2430	130 - 780

The range selection of the speed is selected by means of the gear selector switches.

Only switch during standstill of drilling spindle.

Set the speed using the rotary knob in the control panel while the drilling spindle is running.

The speed is shown in the display.



4.8 Spindle sleeve feed

CAUTION!

Danger by bumping due to the drill levers at the end of the manual or automatic spindle sleeve feed The return spring biases and discharges the stored energy.



4.8.1 Manual spindle sleeve feed

Move the sleeve downward by means of the spindle sleeve lever. The sleeve is returned to its initial position by means of the spring force.

4.8.2 Automatic spindle sleeve feed

INFORMATION

The spindle sleeve feed only works if the direction of rotation is correct.

The feed is activated by pressing the push buttons in the spindle sleeve lever. The feed is performed by an electromagnetic coupling. The feed is switched off by means of the electronic drill depth indicator, or by pressing the push button again in the spindle sleeve lever or by pressing the optional foot switch.

→ Select the speed of the spindle sleeve feed actuating the selector rotary switch.



INFORMATION

The higher the pre-set speed the more rapid is the feed speed on the sleeve. Adjust the correct speed depending on the used material and on the drill diameter.

→ Adjust the drill depth stop. ► Electronic drilling depth - Setting the signal tone on page 30.

→ Press the push button in the spindle sleeve lever. The electromagnetic spindle sleeve feed is activated.



- Press the push button in the spindle sleeve lever again. The electromagnetic spindle sleeve feed will deactivated.
- When the preset electronic drilling depth is reached, the drilling feed is deactivated. The drilling sleeve returns to the top position by spring force.

4.9 Disassembly, assembly of drill chucks and drill bits

Taper mandrels can be drifted out with the integrated drill drift or with an ordinary drill drift.

4.9.1 Use of the drill chuck

CAUTION!

Make sure that the clamped tool is firmly and correctly fitted.



4.9.2 Disassembly with integrated drill drift

ATTENTION!

The tool and/or the drill chuck will fall down. Hold the tool or the drill chuck while drifting it out.

With the below described procedure the taper mandrel is being loosened from the drilling spindle.

- Move the sleeve downwards until the locking bolt can be pulled out.
- Press the sleeve lever with a fast and powerful movement upwards.

The taper mandrel is pressed out of the drill spindle.

- Then push the locking bolt back in.



INFORMATION

The machine cannot be started, if the locking pin of integrated drill drift is in drifting position.



4.9.3 Fitting the drill chuck

The drill chuck or the tool is secured in the drill spindle against turning over by means of a form-locking connection (driver).

A frictionally engaged connection keeps and centres the drill chuck or the drill in the drill spindle.

- Check and, if necessary, clean the conical seat in the drilling spindle and at the taper mandrel of the tool or the drill chuck.
- Press the taper mandrel into the drill spindle.

4.10 Coolant system

- Adjust the flow using the shut-off and dosing tap.

ATTENTION!

Destruction of the pump due dry running.



The pump is lubricated by the cooling agent. Do not operate the pump without coolant. Clean the collection container of the chip filter in regular intervals.

WARNING!

Discharge and overflow of cooling lubricants and lubricants Make sure you do not get the cooling lubricants on the floor. Spilled on the floor cooling agents must be removed immediately.

Regularly clean the coolant tank.



CAUTION!

The cooling lubricant needs to be checked at least weekly, including during downtimes, with regard to its concentration, ph-value, bacteria and fungal decay.

- Cooling lubricants and tanks on page 62
- „7.6.1 Inspection plan for water-mixed cooling lubricants“ on page 63

Please note the VKIS - VSI - IGM substance list for coolant lubricants as per DIN 51385 for metal working.



4.11 Footswitch - Rotation reversal

Use the optional foot switch for a reversal of direction for tapping or for switching off the spindle sleeve feed.



Item: 3050032

5 Determining the cutting speed and the speed

5.1 Table cutting speeds / infeed

Material table						
Material to be processed	Recommended cutting speed V_c in m/min	Recommended infeed f in mm/revolution				
		Drill bit diameter d in mm				
		2...3	>3...6	>6...12	>12...25	>25...50
Unalloyed construction steels < 700 N/mm ²	30 - 35	0.05	0.10	0.15	0.25	0.35
Alloyed construction steels > 700 N/mm ²	20 - 25	0.04	0.08	0.10	0.15	0.20
Alloyed steels < 1000 N/mm ²	20 - 25	0.04	0.08	0.10	0.15	0.20
Steels, low stability < 800 N/mm ²	40	0.05	0.10	0.15	0.25	0.35
Steel, high stability > 800 N/mm ²	20	0.04	0.08	0.10	0.15	0.20
non-rust steels > 800 N/mm ²	12	0.03	0.06	0.08	0.12	0.18
Cast iron < 250 N/mm ²	15 - 25	0.10	0.20	0.30	0.40	0.60
Cast iron > 250 N/mm ²	10 - 20	0.05	0.15	0.25	0.35	0.55
CuZn alloy brittle	60 - 100	0.10	0.15	0.30	0.40	0.60
CuZn alloy ductile	35 - 60	0.05	0.10	0.25	0.35	0.55
Aluminium alloy up to 11% Si	30 - 50	0.10	0.20	0.30	0.40	0.60
Thermoplastics	20 - 40	0.05	0.10	0.20	0.30	0.40
Thermosetting materials with organic filling	15 - 35	0.05	0.10	0.20	0.30	0.40
Thermosetting materials with an-organic filling	15 - 25	0.05	0.10	0.20	0.30	0.40

5.2 Speed table

V_c in m/min	4	6	8	10	12	15	18	20	25	30	35	40	50	60	80	100
Drill bit $\varnothing$ in mm	Speed n in rpm															
1,0	1274	1911	2548	3185	3822	4777	5732	6369	7962	9554	11146	12739	15924	19108	25478	31847
1,5	849	1274	1699	2123	2548	3185	3822	4246	5308	6369	7431	8493	10616	12739	16985	21231
2,0	637	955	1274	1592	1911	2389	2866	3185	3981	4777	5573	6369	7962	9554	12739	15924

Drilling_Vc_GB.m

2,5	510	764	1019	1274	1529	1911	2293	2548	3185	3822	4459	5096	6369	7643	10191	12739
3,0	425	637	849	1062	1274	1592	1911	2123	2654	3185	3715	4246	5308	6369	8493	10616
3,5	364	546	728	910	1092	1365	1638	1820	2275	2730	3185	3640	4550	5460	7279	9099
4,0	318	478	637	796	955	1194	1433	1592	1990	2389	2787	3185	3981	4777	6369	7962
V_c in m/min	4	6	8	10	12	15	18	20	25	30	35	40	50	60	80	100
Drill bit Ø in mm	Speed n in rpm															
4,5	283	425	566	708	849	1062	1274	1415	1769	2123	2477	2831	3539	4246	5662	7077
5,0	255	382	510	637	764	955	1146	1274	1592	1911	2229	2548	3185	3822	5096	6369
5,5	232	347	463	579	695	869	1042	1158	1448	1737	2027	2316	2895	3474	4632	5790
6,0	212	318	425	531	637	796	955	1062	1327	1592	1858	2123	2654	3185	4246	5308
6,5	196	294	392	490	588	735	882	980	1225	1470	1715	1960	2450	2940	3920	4900
7,0	182	273	364	455	546	682	819	910	1137	1365	1592	1820	2275	2730	3640	4550
7,5	170	255	340	425	510	637	764	849	1062	1274	1486	1699	2123	2548	3397	4246
8,0	159	239	318	398	478	597	717	796	995	1194	1393	1592	1990	2389	3185	3981
8,5	150	225	300	375	450	562	674	749	937	1124	1311	1499	1873	2248	2997	3747
9,0	142	212	283	354	425	531	637	708	885	1062	1238	1415	1769	2123	2831	3539
9,5	134	201	268	335	402	503	603	670	838	1006	1173	1341	1676	2011	2682	3352
10,0	127	191	255	318	382	478	573	637	796	955	1115	1274	1592	1911	2548	3185
11,0	116	174	232	290	347	434	521	579	724	869	1013	1158	1448	1737	2316	2895
12,0	106	159	212	265	318	398	478	531	663	796	929	1062	1327	1592	2123	2654
13,0	98	147	196	245	294	367	441	490	612	735	857	980	1225	1470	1960	2450
14,0	91	136	182	227	273	341	409	455	569	682	796	910	1137	1365	1820	2275
15,0	85	127	170	212	255	318	382	425	531	637	743	849	1062	1274	1699	2123
16,0	80	119	159	199	239	299	358	398	498	597	697	796	995	1194	1592	1990
17,0	75	112	150	187	225	281	337	375	468	562	656	749	937	1124	1499	1873
18,0	71	106	142	177	212	265	318	354	442	531	619	708	885	1062	1415	1769
19,0	67	101	134	168	201	251	302	335	419	503	587	670	838	1006	1341	1676
20,0	64	96	127	159	191	239	287	318	398	478	557	637	796	955	1274	1592
21,0	61	91	121	152	182	227	273	303	379	455	531	607	758	910	1213	1517
22,0	58	87	116	145	174	217	261	290	362	434	507	579	724	869	1158	1448
23,0	55	83	111	138	166	208	249	277	346	415	485	554	692	831	1108	1385
24,0	53	80	106	133	159	199	239	265	332	398	464	531	663	796	1062	1327
25,0	51	76	102	127	153	191	229	255	318	382	446	510	637	764	1019	1274
26,0	49	73	98	122	147	184	220	245	306	367	429	490	612	735	980	1225
27,0	47	71	94	118	142	177	212	236	295	354	413	472	590	708	944	1180
28,0	45	68	91	114	136	171	205	227	284	341	398	455	569	682	910	1137
29,0	44	66	88	110	132	165	198	220	275	329	384	439	549	659	879	1098
30,0	42	64	85	106	127	159	191	212	265	318	372	425	531	637	849	1062
31,0	41	62	82	103	123	154	185	205	257	308	360	411	514	616	822	1027
32,0	40	60	80	100	119	149	179	199	249	299	348	398	498	597	796	995
33,0	39	58	77	97	116	145	174	193	241	290	338	386	483	579	772	965
34,0	37	56	75	94	112	141	169	187	234	281	328	375	468	562	749	937

35,0	36	55	73	91	109	136	164	182	227	273	318	364	455	546	728	910
36,0	35	53	71	88	106	133	159	177	221	265	310	354	442	531	708	885
37,0	34	52	69	86	103	129	155	172	215	258	301	344	430	516	689	861
38,0	34	50	67	84	101	126	151	168	210	251	293	335	419	503	670	838
V _c in m/min	4	6	8	10	12	15	18	20	25	30	35	40	50	60	80	100
Drill bit Ø in mm	Speed n in rpm															
39,0	33	49	65	82	98	122	147	163	204	245	286	327	408	490	653	817
40,0	32	48	64	80	96	119	143	159	199	239	279	318	398	478	637	796
41,0	31	47	62	78	93	117	140	155	194	233	272	311	388	466	621	777
42,0	30	45	61	76	91	114	136	152	190	227	265	303	379	455	607	758
43,0	30	44	59	74	89	111	133	148	185	222	259	296	370	444	593	741
44,0	29	43	58	72	87	109	130	145	181	217	253	290	362	434	579	724
45,0	28	42	57	71	85	106	127	142	177	212	248	283	354	425	566	708
46,0	28	42	55	69	83	104	125	138	173	208	242	277	346	415	554	692
47,0	27	41	54	68	81	102	122	136	169	203	237	271	339	407	542	678
48,0	27	40	53	66	80	100	119	133	166	199	232	265	332	398	531	663
49,0	26	39	52	65	78	97	117	130	162	195	227	260	325	390	520	650
50,0	25	38	51	64	76	96	115	127	159	191	223	255	318	382	510	637

5.2.1 Example for calculating the required speed on your drilling machine

The necessary speed is depending on the diameter of the drill bit, on the material which is being machined as well as on the cutting material of the drill bit.

Material which needs to be drilled: St37

Cutting material (drill bit): HSS spiral bit

Set point of the cutting speed [V_c] according to the table: 40 meters per minute

Diameter [d] of your drill bit: 30 mm = 0.03 m [meters]

Selected infeed [f] according to the table: about 0.35 mm/rev

$$\text{Speed } n = \frac{V_c}{\pi \times d} = \frac{40 \text{ m}}{\text{min} \times 3.14 \times 0.03 \text{ m}} = 425 \text{ rpm}$$

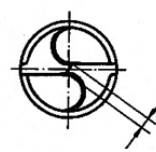
Set a speed on your drilling machine which is less than the determined speed.

INFORMATION

In order to facilitate the production of larger drill holes they need to be pre-drilled. This way, you reduce the cutting forces and improve the guiding of the drill bit.

The pre-drilling diameter is depending on the length of the chisel edge. The chisel edge does not cut, but it squeezes the material. The chisel edge is positioned at an angle of 55° to the major cutting edge.

As a general rule of thumb it applies: The pre-drilling diameter is depending on the length of the chisel edge.



Chisel edge length 10% of the drill bit - Ø



Recommended working steps for a drilling diameter of 30 mm

Example: 1st working step: Pre-drilling with Ø 5 mm. 2nd working step: Pre-drilling with Ø 15 mm. 3rd working step: Drilling with Ø 30 mm.

6 Maintenance

In this chapter you will find important information about

- Inspection,
- Maintenance and
- Repair.

ATTENTION!

Properly performed regular maintenance is an essential prerequisite for

- operational safety,
- failure-free operation,
- long service life of the machine and
- the quality of the products which you manufacture.



Installations and equipment from other manufacturers must also be in good order and condition.

ENVIRONMENTAL PROTECTION

During work on the spindle head, please make sure that

- collecting containers with sufficient capacity for the amount of liquid to be collected are used.
- liquids and oils should not be split on the ground.



Clean up any spilt liquid or oils immediately using proper oil-absorption methods and dispose of them in accordance with current legal requirements on the environment.

Collect leakages

Do not re-introduce liquids spilt outside the system during repair or as a result of leakage from the reserve tank; collect them in a collecting container for disposal.

Disposal

Never dump oil or other environmentally hazardous substances which are harmful to the environment in water inlets, rivers or channels.

Used oils must be delivered to a collection centre. Please consult your supervisor for further information on your nearest collection point.

6.1 Safety

WARNING!

The consequences of incorrect maintenance and repair work may include:

- very serious injury to personnel working on the machine,
- damage to the machine.

Only qualified personnel should carry out maintenance and repair work on the machine.



6.1.1 Preparation

WARNING!

Only work on the machine if it has been disconnected from the power supply.

Attach a warning sign which secures against unauthorized switching on.

After the power supplies have been disconnected from the system, it is necessary to wait for at least five minutes before accessing any electrical connections of the system, this allows time for the high voltage capacitors within the frequency converter to completely discharge.



6.1.2 Restarting

Before restarting, run a safety check.

- Safety check on page 13

WARNING!

Before starting the machine you must be sure that

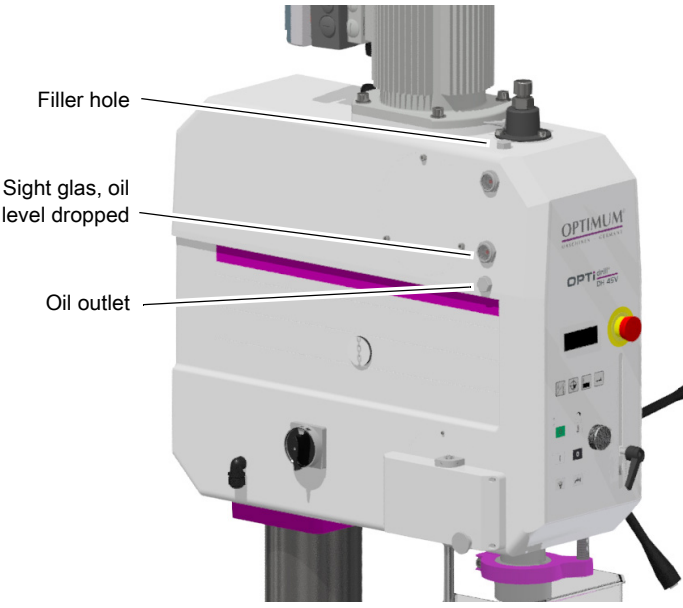
- no dangers generated for persons,
- the machine is not damaged.

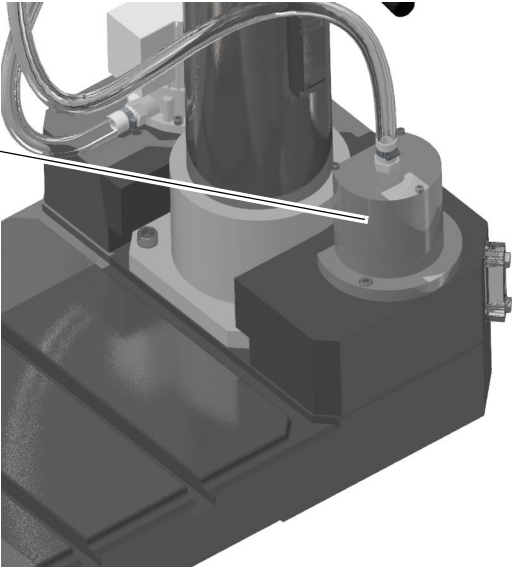


6.2 Inspection and maintenance

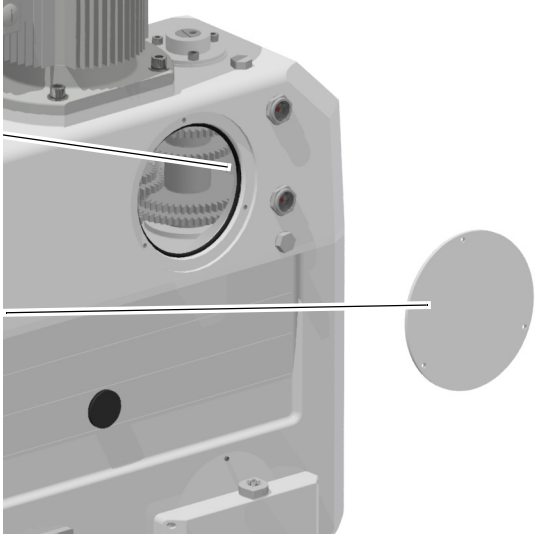
The type and level of wear depends to a large extent on the individual usage and operating conditions. Any indicated intervals therefore are only valid for the corresponding approved conditions.

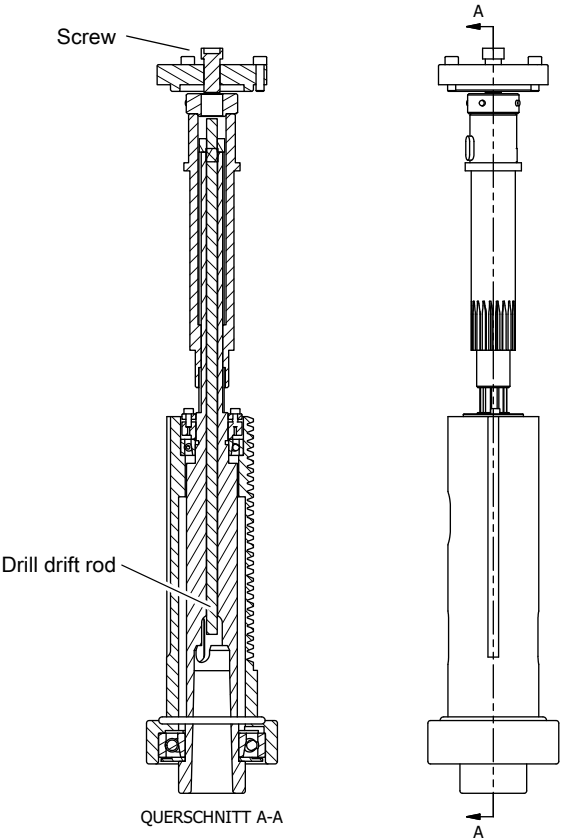
Interval	Where?	What?	How?
Start of shift After each maintenance or repair work	Geared drill	Examination for outside damages. ► Safety check on page 13	
Every month	Drill column and toothed rack	Oiling	→ Lubricate the drill column regularly with commercial oil, machine oil, engine oil. → Lubricate the toothed rod regularly with commercial grease (e.g. friction bearing grease).
Every month	Oiler cup	Oiling	→ Lubricate all oiler cups (height adjustment drilling table) with machine oil, do not use grease guns or the like. ► Operating material on page 18

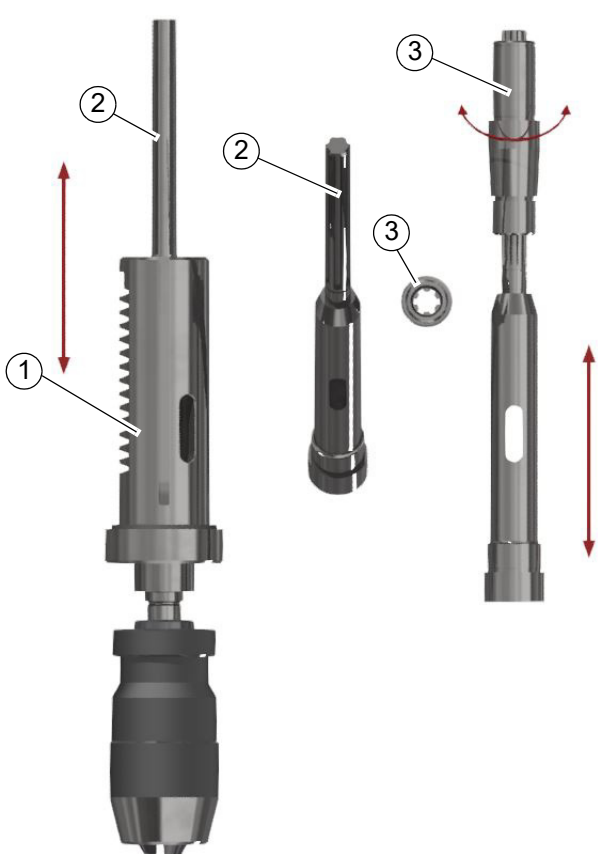
Interval	Where?	What?	How?
the first time after 200 hours of operation, then every 2000 hours	Gear	Refilling oil Oil change	→ For oil change use an appropriate collecting tray of sufficient capacity. → Remove the filler hole plug. → Remove the oil drain plug. → If necessary use sealing tape for drain plug. → Fill in the open lubricating system of the geared drill about 3 litres of oil. → Check if the oil level is correct via the sight glass. The sight glass (oil level dropped) must be half covered.  Img.6-1: Gear oil level

Interval	Where?	What?	How?
Monthly	Chip filter	Cleaning	The chip filter prevents the reflux of chips in the coolant tank. Clean the chip filter regularly. Impurities in the cooling lubricant cause blockages and reducing the life of the cooling lubricant pump. Replace the cooling agent regularly, depending on usage. → To do so, unscrew the chip filter and remove the chips or other soiling. → Empty and clean the collecting tray. 

Img.6-2: Chip filter

Interval	Where?	What?	How?
as required	Gear	Visual inspection	The transmission can be subjected to a visual inspection relatively easily. For this purpose, the gear head does not have to be disassembled, or largely disassembled.  → Drain the oil → Fully unscrew the mounting screws of the cover. → Slightly twist the cover in the sealing seat. → Then use the mounting screws to press the cover off the seal.

Interval	Where?	What?	How?
in case of need	Drill drift function	Readjust	If necessary, screw in the screw further so that the ejector rod reaches your taper mandrel driver.  QUERSCHNITT A-A Img.6-3: Drill drift rod

Interval	Where?	What?	How?
in case of need	Toothing of the spindle	Lubrication	Any unusual rattling noises can be eliminated by regreasing. The sleeve (1) moves downwards or upwards with the toothed spindle (2) in the fixed driven sleeve (3) during drill feed. The noises are caused by the necessary clearance between the two toothings of the sleeve and spindle. The grease in the delivery condition may have been used up.  Img. 6-4: Regreasing is carried out from above via the spindle drive. Apply grease at the visible toothed area of the spindle. It is recommended to use a grease which can remain permanently inside the toothing. The grease "Staburag NBU 30 PTM" from Klüber is recommended and has proved to be a successful assembly grease for clearance fits.
at least annually	Cooling lubricant system	Replacing Cleaning Disinfect	► Cooling lubricants and tanks on page 62 ► Inspection plan for water-mixed cooling lubricants on page 63

Interval	Where?	What?	How?
based on operator's historic values in accordance with German DGUV (BGV A3)	Electronics	Electrical inspection	► Obligations of the operating company on page 11 ► Electronics on page 16
as required	Spindle return spring	Readjusting	 ATTENTION! Parts may fly off at high speed. When disassembling the key housing, please make sure that the machine is only maintained and prepared by qualified staff.

INFORMATION

The spindle bearing is lifetime-lubricated. It is not necessary to lubricate it again.



6.3 Repair

6.3.1 Customer service technician

For any repair work request the assistance of an authorised customer service technician. Contact your specialist dealer if you do not have customer service's information or contact Stürmer Maschinen GmbH in Germany who can provide you with a specialist dealer's contact information. Optionally, the

Stürmer Maschinen GmbH

Dr.-Robert-Pfleger-Str. 26

D- 96103 Hallstadt

can provide a customer service technician, however, the request for a customer service technician can only be made via your specialist dealer.

If the repairs are carried out by qualified technical personnel, they must follow the indications given in these operating instructions.

Optimum Maschinen Germany GmbH accepts no liability nor does it guarantee against damage and operating malfunctions resulting from failure to observe these operating instructions.

For repairs, only use

- faultless and suitable tools only,
- original parts or parts from series expressly authorised by Optimum Maschinen Germany GmbH.

7 Ersatzteile - Spare parts

7.1 Ersatzteilbestellung - *Ordering spare parts*

Bitte geben Sie folgendes an - *Please indicate the following :*

- ☐ Seriennummer - *Serial No.*
- ☐ Maschinenbezeichnung - *Machines name*
- ☐ Herstellungsdatum - *Date of manufacture*
- ☐ Artikelnummer - *Article no.*

Die Artikelnummer befindet sich in der Ersatzteilliste. *The article no. is located in the spare parts list.* Die Seriennummer befindet sich am Typschild. *The serial no. is on the rating plate.*

7.2 Hotline Ersatzteile - Spare parts Hotline



+49 (0) 951-96555 -118
ersatzteile@stuermer-maschinen.de



7.3 Service Hotline

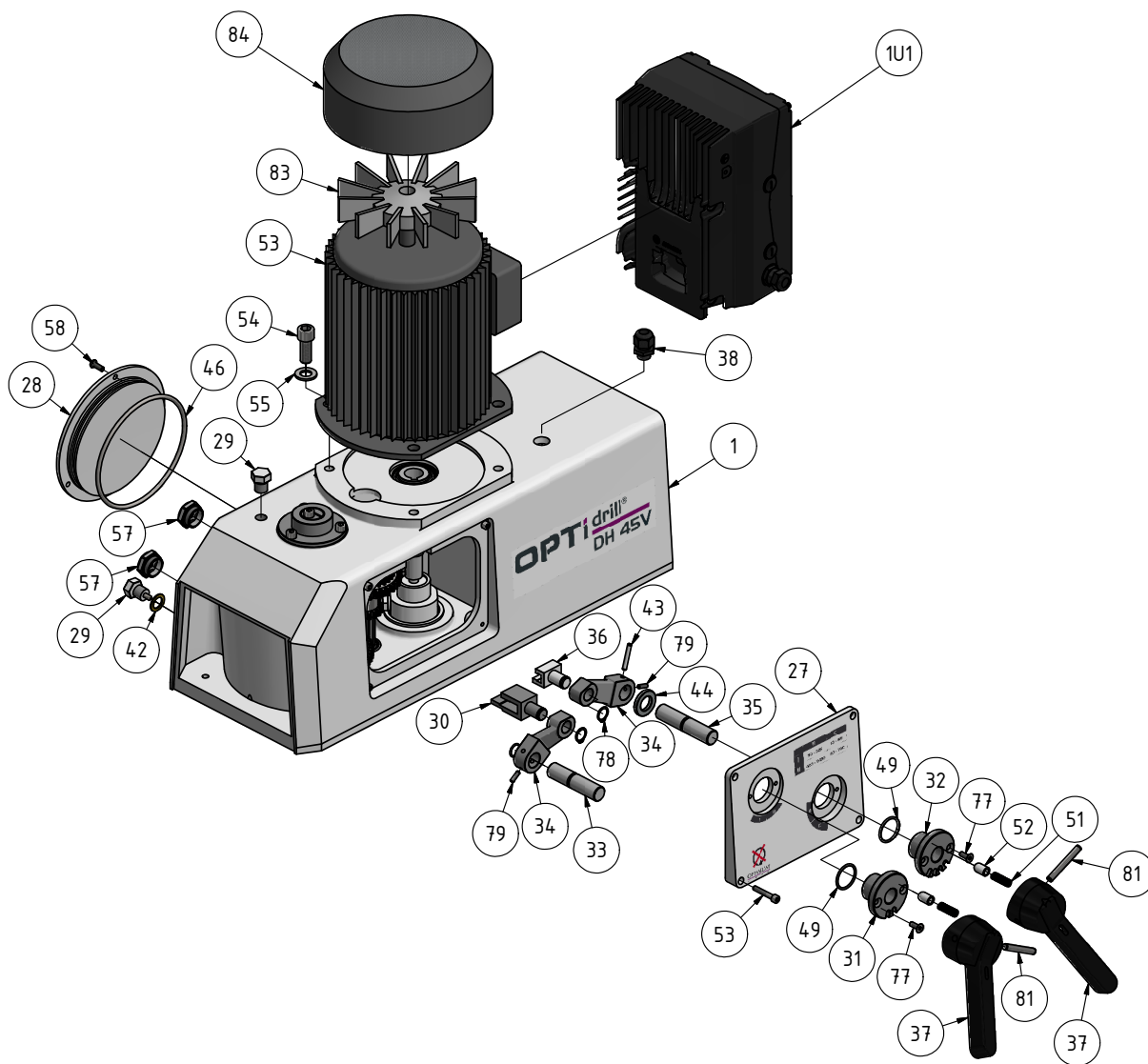


+49 (0) 951-96555 -100
service@stuermer-maschinen.de

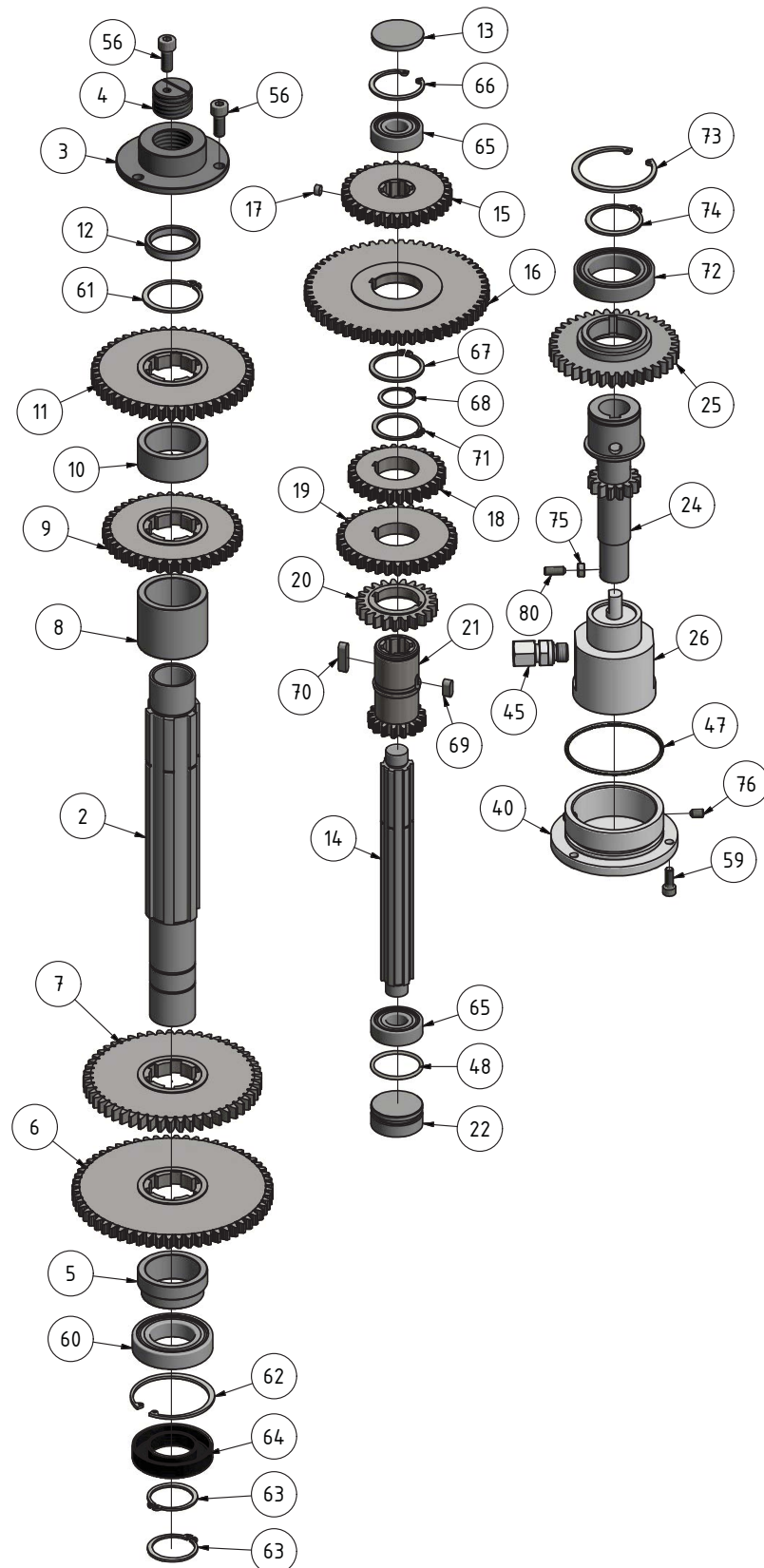


7.4 Ersatzteilzeichnungen Spare part drawings

M Getriebe Baugruppe Antrieb - Gearbox drive assembly



B

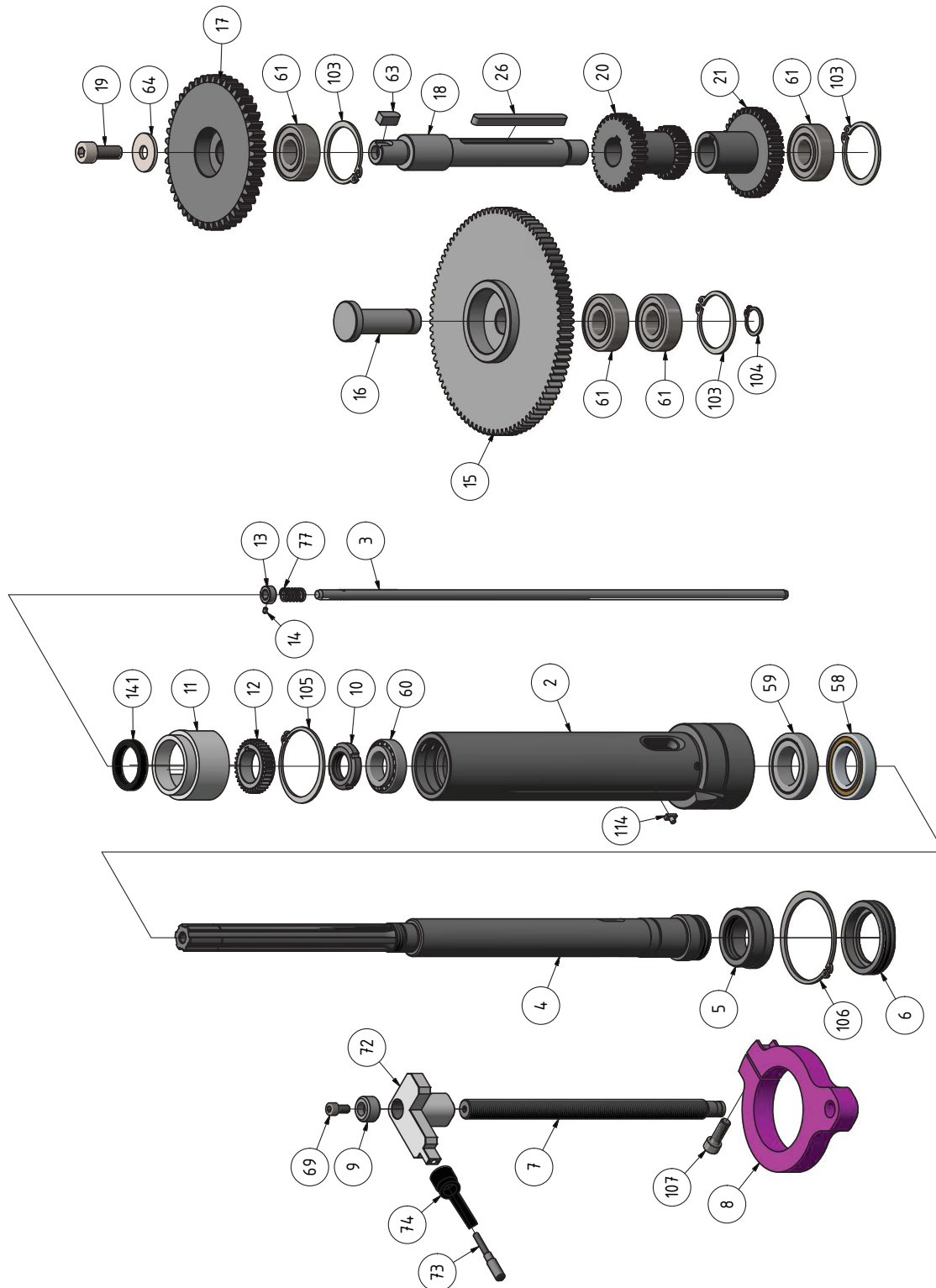


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Getriebe Baugruppe Antrieb - Gearbox drive assembly					
Pos.	Bezeichnung	Description	Menge Qty.	Grösse Size	Artikelnummer Item no.
1	Gehäuse	Housing	1		03034255101
2	Welle	Shaft	1		03034255102
3	Flansch	Flange	1		03034255103
4	Bolzen	Bolt	1		03034255104
5	Buchse	Bushing	1		03034255105
6	Zahnrad	Gear	1		03034255106
7	Zahnrad	Gear	1		03034255107
8	Hülse	Sleeve	1		03034255108
9	Zahnrad	Gear	1		03034255109
10	Hülse	Sleeve	1		
11	Zahnrad	Gear	1		03034255111
12	Ring	Ring	1		
13	Verschluss	Plug	1		
14	Welle	Shaft	1		03034255114
15	Zahnrad	Gear	1		03034255115
16	Zahnrad	Gear	1		03034255116
17	Passfeder	Fitting key	1		
18	Zahnrad	Gear	1		03034255118
19	Zahnrad	Gear	1		03034255119
20	Zahnrad	Gear	1		03034255120
21	Zahnrad	Gear	1		03034255121
22	Verschluss	Plug	1		03034255122
24	Welle	Shaft	1		03034255124
25	Zahnrad	Gear	1		03034255125
26	Encoder	Encoder	1		03034255126
27	Abdeckung	Cover	1		03034255127
28	Abdeckung	Cover	1		03034255128
29	Schraube	Screw	2		
30	Gabel	Fork	1		03034255130
31	Flansch	Flange	1		03034255131
32	Flansch	Flange	1		03034255132
33	Welle	Shaft	1		03034255133
34	Platte	Plate	2		03034255134
35	Welle	Shaft	1		03034255135
36	Gabel	Fork	1		03034255136
37	Schalthebel	Switch lever	2		03034255137
38	Zugentlastung	Strain relief	1		
40	Flansch	Flange	1		
42	Dichtung	Seal	1	24X16X1.5	
43	Zylinderstift	Zylindrical pin	2	5x35	
44	Ring	Ring	1		
45	Anschluss	Plug	1		
46	O-Ring	O-ring	1	150x5.3	
47	O-Ring	O-ring	1	71x2.65	
48	O-Ring	O-ring	1	35.5x2.65	
49	O-Ring	O-ring	2	30x2.65)	
50	Feder	Spring	2		
51	Stift	Pin	2		
52	Innensechskantschraube	Socket head screw	4	ISO 4762 - M6 x 35	
53	Motor	Motor	1		03034255153
54	Innensechskantschraube	Socket head screw	4	ISO 4762 - M14 x 35	
55	Scheibe	Washer	4	DIN 125 - A 15	
56	Innensechskantschraube	Socket head screw	4	ISO 4762 - M8 x 20	
57	Ölschauglas	Oil sight glass	2		
58	Schraube	Screw	3	ISO 7380-1 - M6 x 16	
59	Innensechskantschraube	Socket head screw	3	ISO 4762 - M6 x 16	
60	Kugellager	Ball bearing	2	6007	0406007
61	Sicherungsring	Retaining ring	1	DIN 471 - 42x1,75	042SR42I
62	Sicherungsring	Retaining ring	1	DIN 472 - 62x2	042SR62I
63	Sicherungsring	Retaining ring	2	DIN 471 - 35x1,5	042SR35I
64	Dichtung	Seal	1	35x62x12	
65	Kugellager	Ball bearing	2	6203	0406203
66	Sicherungsring	Retaining ring	1	DIN 472 - 40 x 1,75	042SR40I
67	Sicherungsring	Retaining ring	1	DIN 471 - 38x1,75	042SR38W
68	Sicherungsring	Retaining ring	1	DIN 471 - 25x1,2	042SR25
70	Passfeder	Fitting key	1	DIN 6885 - A 6 x 6 x 25	042P6628
71	Sicherungsring	Retaining ring	1	DIN 471 - 34x1,5	042SR34W
72	Kugellager	Ball bearing	1	61908	04061908
73	Sicherungsring	Retaining ring	1	DIN 472 - 62 x 2	042SR62I
74	Sicherungsring	Retaining ring	1	DIN 471 - 40x1,75	042SR40I
75	Sechskantmutter	Hexagon nut	1	ISO 4032 - M6	
76	Gewindestift	Grub srew	2	DIN 916 - M6 x 10	

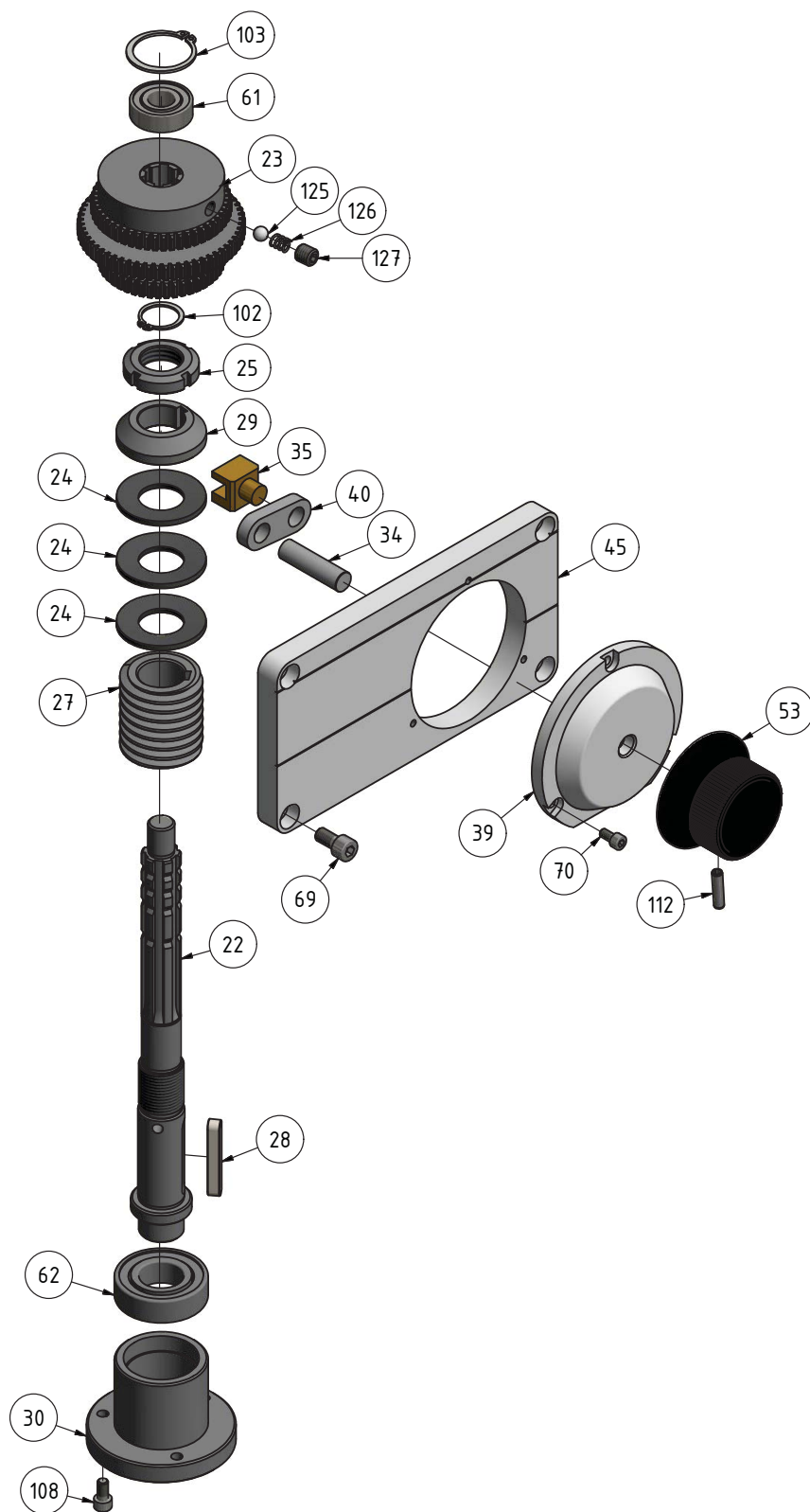
Getriebe Baugruppe Antrieb - Gearbox drive assembly					
Pos.	Bezeichnung	Description	Menge Qty.	Grösse Size	Artikelnummer Item no.
77	Schraube	Screw	4	DIN 7991 - M6x16	
78	Sicherungsring	Retaining ring	2	DIN 471 - 16x1	042SR16W
79	Gewindestift	Grub srew	2	DIN 916 - M5 x 16	
80	Gewindestift	Grub srew	1	DIN 916 - M6 x 16	
81	Zylinderstift	Cylindrical pin	2	ISO 2338 - 8 h8 x 60	
82	O-Ring	O-ring	2	DIN 3771 - 15 x 2,65	
83	Lüfter	Fan	1		03034255183
84	Lüfterdeckel	Fan cover	1		03034255184
1U1	Frequenzumrichter	Frequency converter	1	Kostal	030342631U1

D

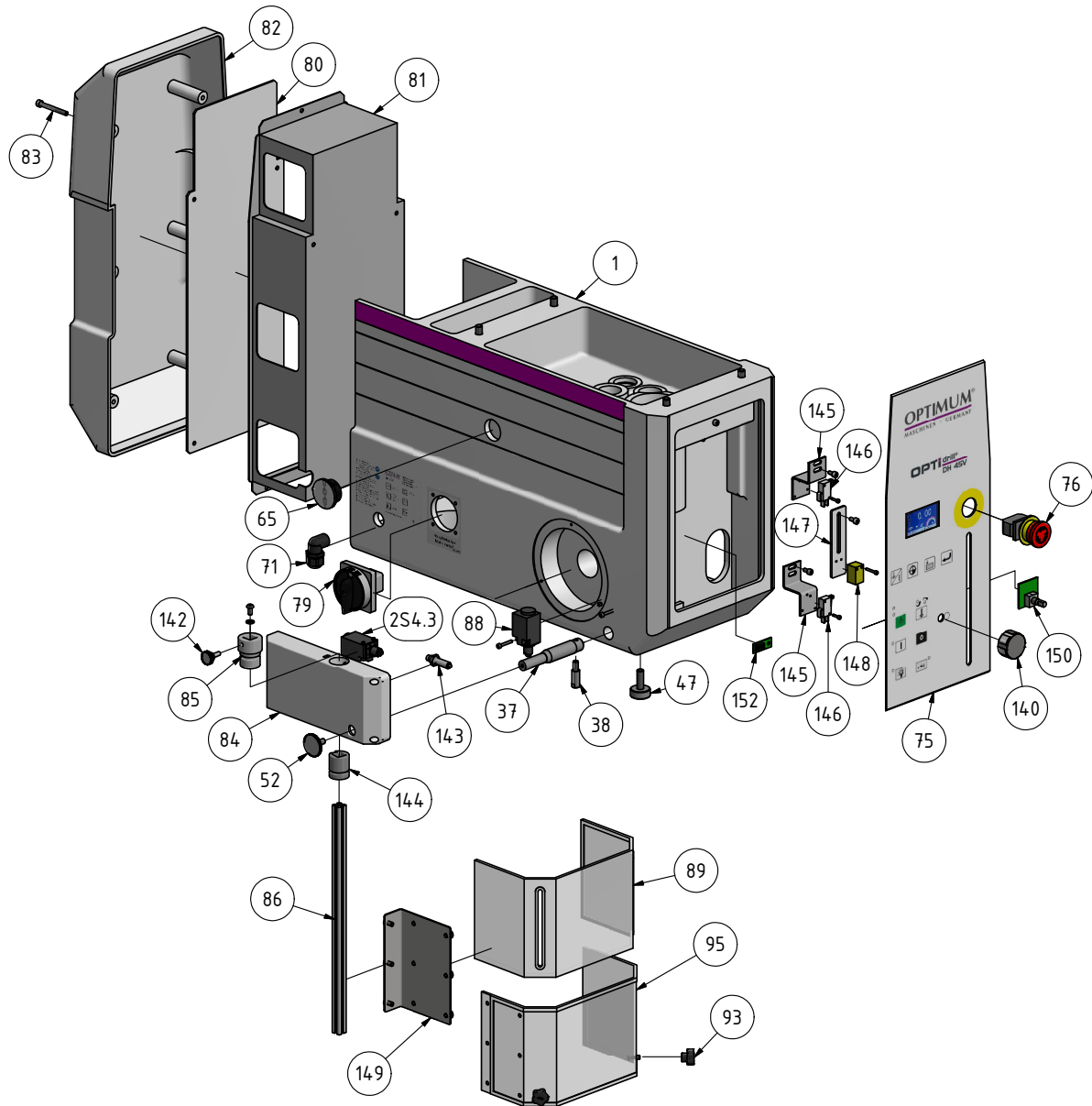


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E



N



Getriebe Baugruppe Spindel und Vorschub - Gearbox spindle and feed assembly

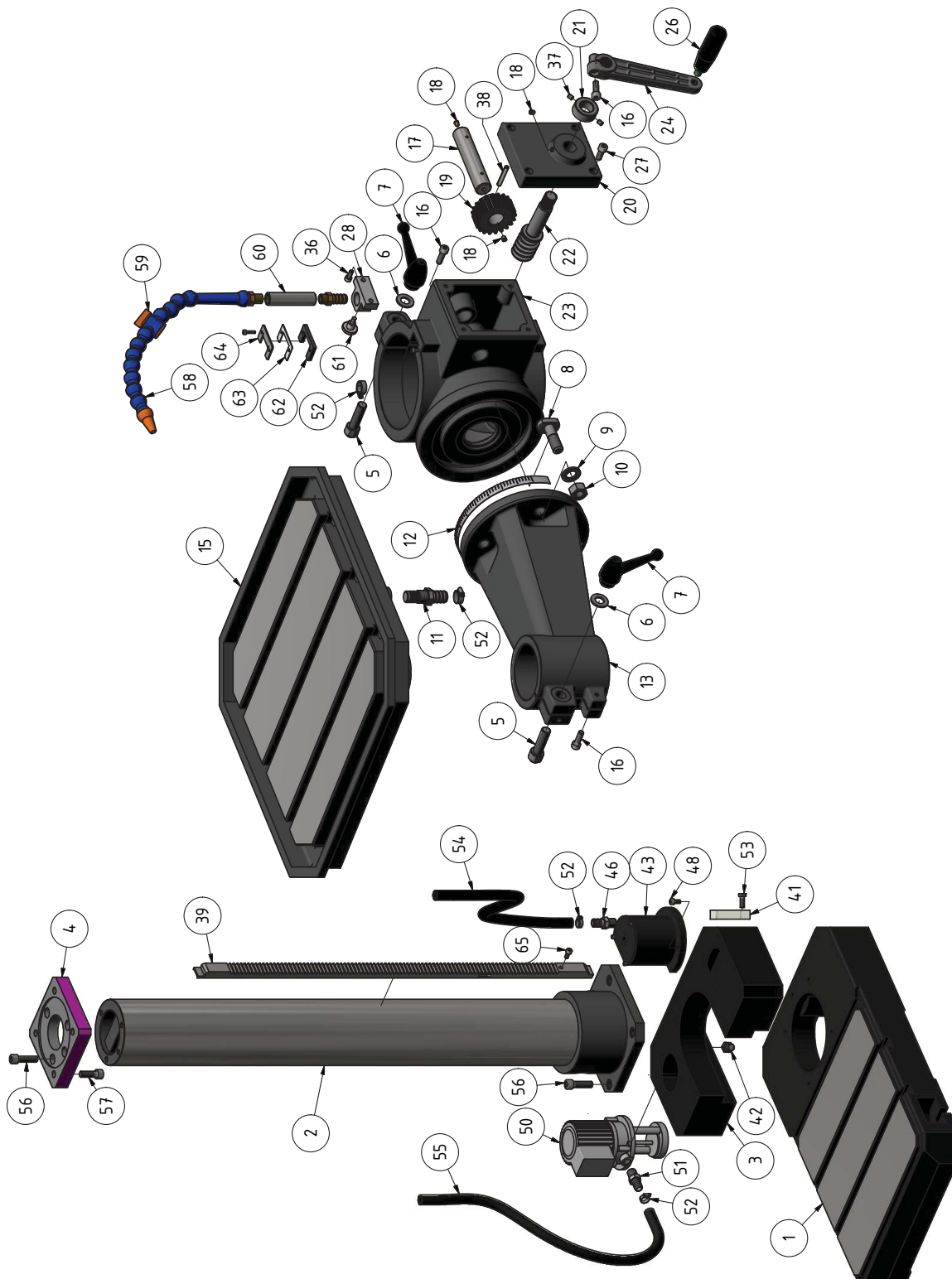
Pos.	Bezeichnung	Description	Menge Qty.	Grösse Size	Artikelnummer Item no.
1	Gehäuse	Housing	1		03034255201
2	Pinole	Sleeve	1		03034255202
3	Welle	Shaft	1		03034255203
4	Bohrspindel	Drill spindle	1		03034255204
5	Buchse	Bushing	1		03034255205
6	Klemmmutter	Clamping nut	1		
7	Spindel	Spindle	1		03034255207
8	Aufnahme	Collet	1		03034255208
9	Buchse	Bushing	1		
10	Nutmutter	Groove nut	1	M30X1.5	03034255210
11	Buchse	Bushing	1		03034255211
12	Zahnrad	Gear	1		03034255212
13	Buchse	Bushing	1		
14	Gewindestift	Grub screw	1	M4X6	
15	Zahnrad	Gear	1		03034255215
16	Bolzen	Bolt	1		03034255216

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Getriebe Baugruppe Spindel und Vorschub - Gearbox spindle and feed assembly					
Pos.	Bezeichnung	Description	Menge Qty.	Grösse Size	Artikelnummer Item no.
17	Zahnrad	Gear	1		03034255217
18	Welle	Shaft	1		03034255218
19	Innensechskantschraube	Socket head screw	1	M8X20	
20	Zahnrad	Gear	1		03034255220
21	Zahnrad	Gear	1		03034255221
22	Welle	Shaft	1		03034255222
23	Zahnrad	Gear	1		03034255223
24	Scheibe	Washer	3		
25	Nutmutter	Groove nut	1	M25X1.5	03034255225
26	Passfeder	Fitting key	1	5X70	
27	Schnecke	Worm	1		03034255227
28	Passfeder	Fitting key	1	8X50	
29	Buchse	Bushing	1		03034255229
30	Flansch	Flange	1		03034255230
33	Rückholfeder	Retaining spring	1		03034255233
34	Bolzen	Bolt	1		
35	Schaltgabel	Switch fork	1		03034255235
36	Abdeckung	Cover	1		03034255236
37	Welle	Shaft	1		03034255237
38	Bolzen	Bolt	1		
39	Abdeckung	Cover	1		03034255239
40	Platte	Plate	1		
45	Platte	Plate	1		03034255245
47	LED Leuchte	LED light	2		03034255247
52	Schraube	Screw	1		03034255252
53	Wahlschalter	Mode switch	1		03034255253
54	Scheibe	Washer	1		
58	Kugellager	Ball bearing	1	6008	0406008R
59	Kegelrollenlager	Taper roller bearing	1	32008	04032008
60	Kegelrollenlager	Taper roller bearing	1	32006	04032006
61	Kugellager	Ball bearing	5	6202	0406202
62	Kugellager	Ball bearing	1	6205	0406205
63	Passfeder	Fitting key	1	6x11	042P6612
64	Scheibe	Scheibe	1		
65	Verschluss	Plug	2		
68	Innensechskantschraube	Socket head screw	3	ISO 4762 - M3 x 6	
69	Innensechskantschraube	Socket head screw	5	ISO 4762 - M8 x 16	
70	Innensechskantschraube	Socket head screw	3	ISO 4762 - M5 x 10	
71	Zugentlastung	Strain relief	1		
72	Führung	Guide	1		03034255272
73	Bolzen	Bolt	1		03034262273
74	Klemmhebel	Clamping lever	1		03034262274
75	Drucktastenbedienfeld mit Grafik Display	Push-button control panel with graphic display	1	DH45V	030342531A1
76	Not-Halt Schalter	Emergency stop button	1		03034255276
79	Hauptschalter	Main switch	1		03034255279
80	Abdeckung	Cover	1		03034255280
81	Gehäuse	Housing	1		03034255281
82	Abdeckung	Cover	1		03034262282
83	Innensechskantschraube	Socket head screw	6	ISO 4762 - M6 x 55	
84	Abdeckung	Cover	1		03034255284
85	Bolzen	Bolt	1		03034255285
86	Aluprofil	Aluminium profile	1		03034255286
88	Endschalter	End switch	1	KEDU QKS7	03300181671
89	Bohrfutterschutz	Drill chuck protection	1		030342552FS
92	Innensechskantschraube	Socket head screw	4	ISO 4762 - M4 x 16	
93	Klemmschraube	Clamping screw	2		
94	Schraube	Screw	2		
95	Bohrfutterschutz	Drill chuck protection	1		
97	Innensechskantschraube	Socket head screw	1	DIN 913 - M5 x 12	
101	Innensechskantschraube		6	ISO 4762 - M8 x 25	
102	Sicherungsring		1	DIN 471 - 22x1,2	042SR22I
103	Sicherungsring		4	DIN 471 - 35x1,5	042SR35I
104	Sicherungsring		1	DIN 471 - 15x1	042SR15I
105	Sicherungsring		1	DIN 471 - 72x2,5	042SR72I
106	Sicherungsring		1	DIN 471 - 88x3	
107	Innensechskantschraube		1	ISO 4762 - M10 x 30	
108	Innensechskantschraube		3	ISO 4762 - M6 x 12	
109	Sicherungsring		2	DIN 471 - 62x2	
110	Innensechskantschraube		4	ISO 4762 - M8 x 20	
112	Spannstift		1	ISO 13337 - 6 x 24	
113	Schmiernippel		1	8	0340114
114	Führungsstück		1		030342622114

Getriebe Baugruppe Spindel und Vorschub - Gearbox spindle and feed assembly					
Pos.	Bezeichnung	Description	Menge Qty.	Grösse Size	Artikelnummer Item no.
115	Sensor		1		030342622115
116	Anschlusstecker mit Deckel	Connector with cover	1		030342622116
117	Buchse	Bushing	1		030342622117
118	Welle	Shaft	1		030342622118
119	Passfeder	Fitting key	1	8x7x35	042P8735
120	Passfeder	Fitting key	1	8x7x20	042P8720
121	Buchse	Bushing	1		030342622121
122	Abdeckung	Cover	1		030342622122
123	Schneckenrad	Worm wheel	1		030342622123
124	Ring	Ring	1		030342622124
125	Buchse	Bushing	1		030342622125
126	Magnetkupplung	Magnet clutch	1		030342622126
127	Buchse	Bushing	1		
128	Sicherungsring	Retaining ring	2	52x2	042SR52W
129	Kugellager	Ball bearing	1	6205	0406205R
130	Sechskantmutter	Hexagon nut	2		
131	Halter	Holder	1		030342622131
132	El. Bürste	El. Brush	2		030342622132
133	Abdeckung	Cover	1		
134	Hebel	Lever	4		030342622134
135	Verschluss	Plug	4		030342622135
136	Taster Vorschub	Feed buton	4		030342622136
137	Nabe	Collet	1		03034622137
138	Nutmutter	Groove nut	1		030342622138
140	Einstellknopf	Ajust knob	1		03034252187
141	Dichtung	Seal	1	35x62x12	
142	Klemmschraube	Clamping screw	1		
143	Stopper	Stopper	1		
144	Buchse	Buchse	1		
145	Halter	Holder	2		030342622145
146	Endschalter untere/obere Stellung	Limit switch top/down position	2		030342622146
147	Platte	Plate	1		030342622147
148	Sensor	Sensor	1		030342622148
149	Halter	Holder	1		
150	Potentiometer	Potentiometer	1		03034622150
151	Einstellknopf	Adjust knob	1		03034252187
152	Sensor	Sensor	1		03034622152

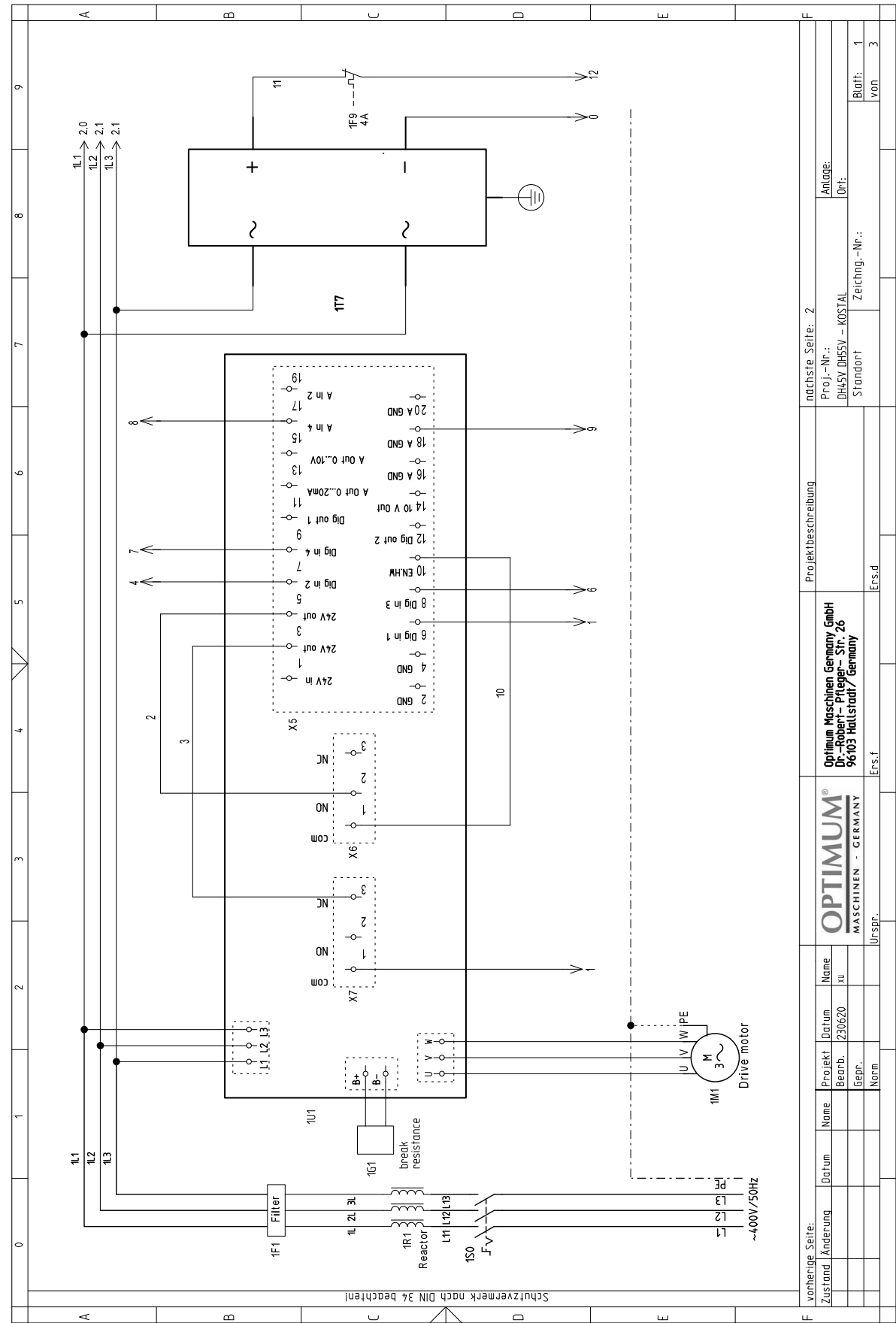
G Baugruppe Bohrsäule und Bohrtisch - Drill column and the table assembly



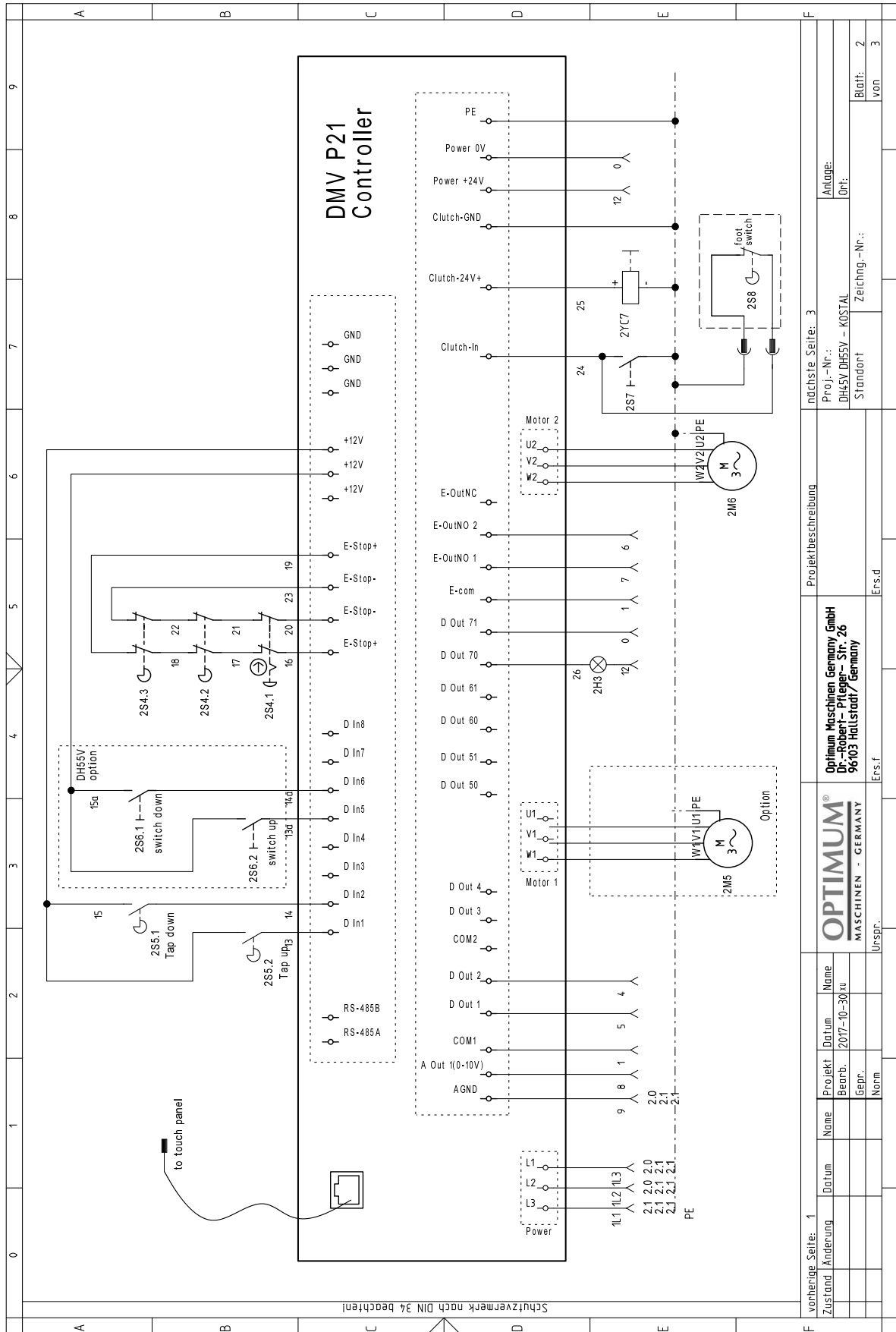
Img.7-1: Bohrsäule und Bohrtisch - Drill column and the table

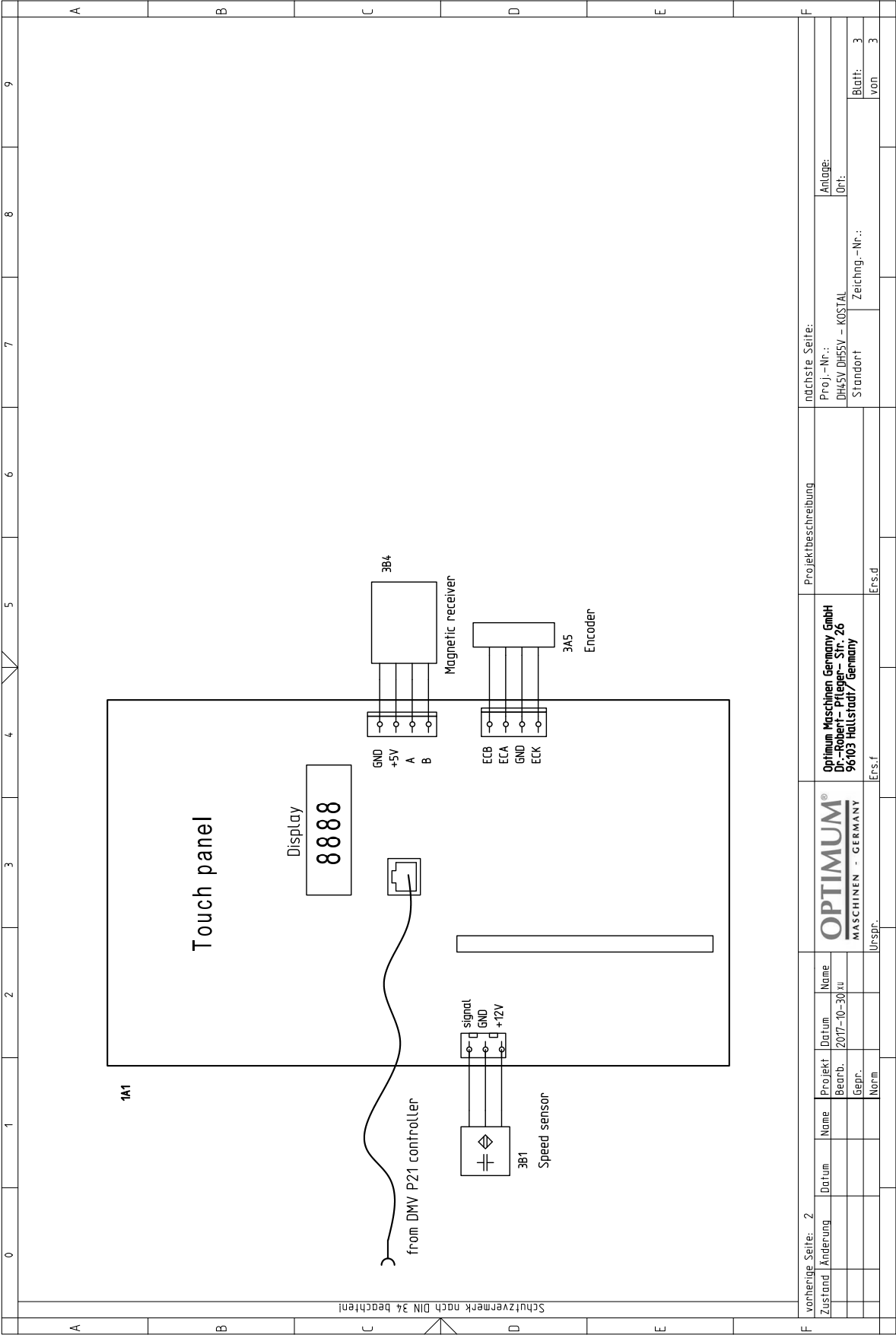
Baugruppe Bohrsäule und Bohrtisch - Drill column and the table assembly					
Pos.	Bezeichnung	Description	Menge Qty.	Grösse Size	Artikelnummer Item no.
1	Grundplatte	Ground plate	1		03034255301
2	Bohrsäule	Drill column	1		03034255302
3	Kühlmittelbehälter	Coolant tank	1		03034255303
4	Flansch	Flange	1		03034255304
5	Schraube	Screw	3		
6	Scheibe	Washer	3		
7	Spannhebel	Clamping lever	3		
8	Bolzen	Bolt	3		
9	Scheibe	Washer	3		
10	Sechskantmutter	Hexagon nut	3		
11	Anschluss	Plug	1		
12	Skalenring	Scale ring	1		03034255312
13	Führung	Guide	1		03034255313
15	Bohrtisch	Drill table	1		03034255315
16	Innensechskantschraube	Socket head screw	3	ISO 4762 - M8 x 25	
17	Welle	Shaft	1		03034255317
18	Schmiernippel	Lubrication cup	3		
19	Zahnrad	Gear	1		03034255319
20	Platte	Plate	1		03034255320
21	Buchse	Bushing	1		
22	Zahnritzel	Gear shaft	1		03034255322
23	Gehäuse	Housing	1		03034255323
24	Kurbel	Crank	1		03034255324
25	Ring	Ring	1		
26	Griff	Handle	1		03034255326
27	Innensechskantschraube	Socket head screw	4	ISO 4762 - M8 x 20	
28	Halter	Holder	1		03034255328
29	Ring	Ring	1		03034255329
36	Innensechskantschraube	Socket head screw	2	ISO 4762 - M6 x 16	
37	Gewindestift	Grub screw	2	DIN 913 - M6 x 8	
38	Spannstift	Spring pin	1	ISO 13337 - 6 x 40	
39	Zahnstange	Rack	1		03034255339
41	Schauglas	Sight glas	1		034030401322
42	Verschlusschraube	Plug screw	1		
46	Anschluss	Plug	1		03034255346
48	Innensechskantschraube	Socket head screw	2	ISO 4762 - M8 x 16	
50	Kühlmittelpumpe	Coolant pump	1		03034255350
51	Anschluss	Plug	1		03034255351
52	Schlauchbinder	Hose clamping	4		
53	Sechskantschraube	Socket head screw	2	ISO 4017 - M10 x 25	
54	Kühlmittelschlauch	Coolant hose	1		03034255354
55	Kühlmittelschlauch	Coolant hose	1		03034255355
56	Innensechskantschraube	Socket head screw	8	ISO 4762 - M14 x 50	
57	Innensechskantschraube	Socket head screw	4	ISO 4762 - M14 x 40	
58	Flexibles Kühlmittelrohr	Flexible coolant tube			03034255358
59	Kugelhahn	Ball valve	1		03034255359
60	Anschlussverlängerung	Connection extension	1		03034255360
61	Klemmschraube	Clamping screw	1		
62	Abstreifer	Wiper	1		03034255362
63	Platte	Plate	1		03034255363
64	Platte	Plate	1		03034255364
65	Schraube	Screw	1	M8x16	

7.5 DH45V - Schaltplan - Wiring diagram - Kostal MP-B



DH45V_parts_Kostal-wiring.fm





DH45V - Ersatzteilliste Elektrische Bauteile - Electric components spare part list					
Pos.	Bezeichnung	Description	Menge Qty.	Grösse Size	Artikelnummer Item no.
1S0	Hauptschalter	Main switch	1	ZHA-20	03034255276
1M1	Motor	Motor	1	YS100-4 400V 2.2kW	03034255153
1U1	Frequenzumrichter	Frequency converter	1	Kostal Inverter 2.2 kW 400V	030342631U1
1G1	Bremswiderstand	Brake resistance	1	24V	030342531G1
1T7	Transformator	Transformer	1	WDR 60W 24V	030342531T7
1F9	Schutzschalter	Circuit breaker	1	4A	030342531F9
DMV	Steuerung	Controller	1	DMV P21 controller	03034253DMV
2S5.1	Wegschalter	Travel switch	1	V-155-1C25	030342622146
2S5.2	Wegschalter	Travel switch	1	V-155-1C25	030342622146
2S4.1	Not-Halt	Emergency stop	1	HY57B-17	03034255276
2S4.2	Schalter Bohrfutterschutz	Cover switch	1	QKS-7	03300181671
2S4.3	Schalter Werkzeugwechsel	Tool change switch	1	HY50-3	030342532S43
2S7	Drucktaster Vorschubhebel	Feed lever push-button	4	MCB-01ABB	030342622136
2H3	Arbeitslicht	Work light	2	24VDC 70cm	03034255247
2M6	Pumpe	Pump	1	400V 100W	03034255350
2YC7	Magnetkupplung	Magnetic clutch	1	DLY0-10AY	030342622126
2S8	Rundstecker (Anschluss Fußpedal)	Circular connector (foot pedal connection)	1	GX16-4	030342532S8
1A1	Drucktastenbedienfeld mit digitaler Grafikanzeige	Touch panel with digital grafic display	1	DH45V	030342531A1
3B1	Drehzahlsensor	Speed sensor	1	PNP-NO	030342533B1
3B4	Magnetempfänger	Magnetic receiver	1	CSD225-025LK 34cm	030342622148
3A5	Potentiometer	Potentiometer	1		03034622150
	Kabel vom Bedienfeld zum Steuergerät	Touch panel cable to controller	1		

7.6 Cooling lubricants and tanks

CAUTION!

The cooling lubricant can cause diseases. Avoid direct contact with cooling lubricant or parts covered in cooling lubricant.



Cooling lubricant circuits and tanks for water-cooling lubricant mixtures must be completely emptied, cleaned and disinfected as needed, but at least once per year or every time the cooling lubricant is replaced.

If fine chips and other foreign matters are accumulated in the coolant tank, the machine can no longer be correctly supplied with coolant. Furthermore, the lifetime of the coolant pump is reduced.

When processing cast iron or similar materials generating fine chips, cleaning the coolant tank more often is recommended.

Limit values

The cooling lubricant must be replaced, the cooling lubricant circuit and tank emptied, cleaned and disinfected if

- the pH value drops by more than 1 based on the value during initial filling. The maximum permissible pH value during initial filling is 9.3
- there is a perceivable change in the appearance, odour, floating oil or increase of the bacteria to more than 10/6/ml
- there is an increase in nitrite content to more than 20 ppm (mg/l) or nitrate content to more than 50 ppm (mg/l)
- there is an increase in the N-nitrosodiethanolamine (NDELA) to more than 5 ppm (mg/a)

CAUTION!

Comply with the manufacturer's specifications for mixture ratios, hazardous substances, e.g. system cleaners, including their permissible minimum use times.



CAUTION!

Since the cooling lubricant escapes under high pressure, pumping out the coolant by using the existing cooling lubricant pump via a pressure hose into a suitable tank is not recommended.



ENVIRONMENTAL PROTECTION

During work on the cooling lubricant equipment please make sure that

- collector tanks are used with sufficient capacity for the amount of liquid to be collected.
- liquids and oils should not be spilled on the ground.



Clean up any spilled liquid or oils immediately using proper oil-absorption methods and dispose of them in accordance with current statutory environmental regulations.

Collect leakages

Do not re-introduce liquids spilled outside the system during repair or as a result of leakage from the reserve tank, instead collect them in a collecting container for disposal.

Disposal

Never dump oil or other substances which are harmful to the environment into water inlets, rivers or channels. Used oils must be delivered to a collection centre. Consult your supervisor if you do not know where the collection centre is.

7.6.1 Inspection plan for water-mixed cooling lubricants

Company: No.: Date: used cooling lubricant			
size to be checked	Inspection methods	Inspection intervals	Procedure and comment
noticeable changes	Appearance, odour	daily	Find and rectify causes, e.g. skim off oil, check filter, ventilate cooling lubricant system
pH value	Laboratory techniques electrometric with pH meter (DIN 51369) Local measurement method: with pH paper (Special indicators with suitable measuring range)	weekly ¹⁾	if pH value decreases > 0.5 based on initial filing: Measures in accordance manufacturer's recommendations > 1.0 based on initial filing: Replace cooling lubricant, clean cooling lubricant circulation system
Usage concentration	Manual refractometer	weekly ¹⁾	Method results in incorrect values with tramp oil content
Base reserve	Acid titration in accordance with Manufacturer's recommendation	as required	Method is independent of tramp oil content
Nitrite content	Test sticks method or laboratory method	weekly ¹⁾	> 20 mg/L nitrite: Replace cooling lubricant or part or inhibiting additives; otherwise NDELA (N-nitrosodiethanolamine) in the cooling lubricant system and in the air must be determined > 5 mg/L NDELA in the cooling lubricant system: Replacement, clean and disinfect cooling lubricant circulation system, find nitrite source and, if possible, rectify.
Nitrate/nitrite content of the preparation water, if this is not removed from the public grid	Test sticks method or laboratory method	as required	Use water from the public grid if there is water from the public grid has > 50 mg/l nitrate: Inform the waterworks

¹⁾ The specified inspection intervals (frequency) are based on continuous operation. Other operational conditions can result in other inspection intervals; exceptions are possible in accordance with Sections 4.4 and 4.10 of the TGS 611.

Editor:

Signature:

Schmierstoffe Lubricant Lubrifiant	Viskosität Viscosity Viscosité ISO VG DIN 51519 mm²/s (cSt)	Kennzeich- nung nach DIN 51502							
Getriebeöl Gear oil Huile de réducteur	VG 680	CLP 680	Aral Degol BG 680	BP Energol GR-XP 680	SPARTAN EP 680	Klüberoil GEM 1-680	Mobilgear 636	Shell Omala S2 GX 680	Meropa 680
	VG 460	CLP 460	Aral Degol BG 460	BP Energol GR-XP 460	SPARTAN EP 460	Klüberoil GEM 1-460	Mobilgear 634	Shell Omala S2 GX 460	Meropa 460
	VG 320	CLP 320	Aral Degol BG 320	BP Energol GR-XP 320	SPARTAN EP 320	Klüberoil GEM 1-320	Mobilgear 632	Shell Omala S2 GX 320	Meropa 320
	VG 220	CLP 220	Aral Degol BG 220	BP Energol GR-XP 220	SPARTAN EP 220	Klüberoil GEM 1-220	Mobilgear 630	Shell Omala S2 GX 220	Meropa 220
	VG 150	CLP 150	Aral Degol BG 150	BP Energol GR-XP 150	SPARTAN EP 150	Klüberoil GEM 1-150	Mobilgear 629	Shell Omala S2 GX 150	Meropa 150
	VG 100	CLP 100	Aral Degol BG 100	BP Energol GR-XP 100	SPARTAN EP 100	Klüberoil GEM 1-100	Mobilgear 627	Shell Omala S2 GX100	Meropa 100
	VG 68	CLP 68	Aral Degol BG 68	BP Energol GR-XP 68	SPARTAN EP 68	Klüberoil GEM 1-68	Mobilgear 626	Shell Omala S2 GX 68	Meropa 68
	VG 46	CLP 46	Aral Degol BG 46	BP Bartran 46	NUTO H 46 (HLP 46)	Klüberoil GEM 1-46	Mobil DTE 25	Shell Tellus S2 MX 46	Anubia EP 46
	VG 32	CLP 32	Aral Degol BG 32	BP Bartran 32	NUTO H 32 (HLP 32)	Klübersynth GEM 4- 32 N	Mobil DTE 24	Shell Tellus S2 MX 32	Anubia EP 32
Hydrauliköl Hydraulic oil Huile hydraulique	VG 32	CLP 32	Aral Vitam GF 32	BP Energol HLP HM 32	NUTO H 32 (HLP 32)	LAMORA HLP 32	Mobil Nuto HLP 32	Shell Tellus S2 M 32	Rando HD HLP 32
	VG 46	CLP 46	Aral Vitam GF 46	BP Energol HLP HM 46	NUTO H 46 (HLP 46)	LAMORA HLP 46	Mobil Nuto HLP 46	Shell Tellus S2 M 46	Rando HD HLP 46
Getriebefett Gear grease Graisse de réducteur		G 00 H-20	Aral FDP 00 (Na-verseift) Aralub MFL 00 (Li-verseift)	BP Energ grease PR-EP 00	FIBRAX EP 370 (Na-verseift)	MICROL-UBE GB 00	Mobilux EP 004	Shell Alva-nia GL 00 (Li-verseift)	Marfak 00

oil-compare-list.fm

Spezialfette, wasserabweisend Special greases, water resistant Graisses spéciales, déperlant			Aral Aralub	Energrease PR 9143		ALTEMP Q NB 50 Klüberpaste ME 31-52	Mobilux EP 0 Mobil Greas- erex 47		
Wälzlagerfett Bearing grease Graisse de roulement		K 3 K-20 (Li-verseift)	Aralub HL 3	BP Energrease LS 3	BEACON 3	CEN- TOPLEX 3	Mobilux 3	Shell Alva- nia R 3 Alva- nia G 3	Multifak Pre- mium 3
Öle für Gleitbahnen Oils for slideways Huiles pour glissières	VG 68	CGLP 68	Aral Deganit BW X 68	BP Maccurat D68	ESSO Febis K68	LAMORA D 68	Mobil Vactra Oil No.2	Shell Tonna S2 M 68	Way lubri- cant X 68
Öle für Hochfrequenzspin- deln Oils for Built-in spindles Huiles pour broches à haute vitesse	VG 68		Deol BG 68	Emergol HLP-D68	Spartan EP 68		Drucköl KLP 68-C	Shell Omala 68	
Fett für spezielle Schmi- erungen an CNC Werkzeu- gmaschinen (Fließfett) Grease for special lubrica- tion on CNC machine tools Graisse pour lubrification spéciale sur machines-out- ils CNC	NLGI Klasse 000 NLGI class 000		ARALUB BAB 000	Grease EP 000	Shell Gadus S4 V45AC	CEN- TOPLEX GLP 500	Mobilux EP 023		Multifak 264 EP 000
Fett für Hochfrequenzspin- deln Grease for Built-in spindles Graisse pour broches à haute vitesse	METAFUX-Fett-Paste (Grease paste) Nr. 70-8508 METAFUX-Moly-Spray Nr. 70-82 Techno Service GmbH ; Detmolder Strasse 515 ; D-33605 Bielefeld ; (++49) 0521- 924440 ; www.metaflux-ts.de								
Kühlschmiermittel Cooling lubricants Lubrifiants de refroidisse- ment			Aral Emusol	BP Sevora	Esso Kutwell		Mobilcut	Shell Adrana	Chevron Sol- uble Oil B

8 Malfunctions

8.1 Drilling machine malfunctions

Malfunction	Cause/ possible effects	Solution
Motor is hot	Wrong electrical connection of 400V machines	
Automatic feed does not work. Spindle running will switched off.	- Wrong direction of spindle rotation - Wrong phase sequence - Clamping lever drilling depth switches off. - Electronic drilling depth switches off. - Electromagnetic clutch is damaged	- Switch to correct spindle rotation - Clamp the clamping lever in the uppermost position. - Check the entered drilling depth. - Check electrical connection - Check clutch, replace if necessary
Noise during work.	- Spindle is too little lubricated - Tool is blunt or wrongly clamped - Gear is too little lubricated	- Lubricate spindle (only possible when disassembled) - Use new tool and check tension (fixed setting of the bit, drill chuck and taper mandril) - Lubricate gear
Bit „burnt“	- Drill speed too high /feed too high - Chips do not come out of the drill hole. - Drill blunt - No or too little cooling	- Select another speed - Extract drill more often during work - Sharpen or use new drill - Use cooling agent
Drill tip is running off centre, the drilled hole is non-round	- Hard points on the workpiece - Length of the cutting spirals/or angles on the tool are unequal - Drill deformed	Use new drill
Drill is defective	No base / support used.	Use support and clamp it with the workpiece
Drill is running non-round or shaking	- Bit deformed - Bearing worn down - Drill is not correctly clamped. - Drill chuck defective	- Use new drill - Have the spindle bearings replaced - Correctly clamp drill - Replace the drill chuck
The drill chuck or the taper mandrel cannot be inserted.	- Dirt, grease or oil on the taper inside of the drill chuck or on the taper surface of the drill spindle - Positioning the follower in the drill spindle is not considered	- Clean surfaces well - Keep surfaces free of grease
Motor does not start.	- Motor is wrongly connected - Fuse is defective - Drill chuck guard not closed	- Have it checked by qualified - Close drill chuck guard
Motor is overheating and there is no power	- Motor overloaded ? - Too low mains voltage - Motor is wrongly connected	- Reduce feed - Disconnect immediately and have it checked by authorized personnel - Have it checked by qualified

Malfunction	Cause/ possible effects	Solution
Precision of the work deficient	- Irregularly heavy or tensed workpiece - Inexact horizontal position of the work-piece holder	- Balance the piece statically and secure without straining - Adjust workpiece-holder
Drilling spindle sleeve does not return to its initial position	Spindle return spring does not work	Check spindle return spring, replace it, if necessary
The drilling spindle cannot be moved downwards.	- Integrated drill has been swiveled inwards - Drill depth adjustment no released	- Swivel integrated drill drift out - Release drill depth adjustment
Spindle bearing overheating	- Bearing worn down - Bearing pretension is too high - Working at high drilling speed over a longer period of time.	- Replace - Increase bearing clearance for fixed bearing (taper roller bearing) - Reduce drill speed and feed rate
Rattle the spindle if the workpiece surface is rough.	- Excessive slack in bearing. - Spindle moves up and down - Clamping chuck is loose - Tool is blunt. - Workpiece is loose	- Reduce bearing clearance or replace bearing - Readjust bearing clearance (fixed bearing) ? - Check, re-tighten - Sharpen or renew the tool. - Clamp the workpiece firmly.

8.2 Malfunctions on the frequency converter

DANGER!

Danger to life due to electric shock!

Death or serious injury!

Disconnect the unit from the power supply and secure it against being switched on again.

If necessary, only replace defective parts or components with original parts.

Danger from electric shock and discharge. Wait two minutes after switching off (discharge time of the capacitors).



INFORMATION

Error messages can only be acknowledged once the error has been remedied.

Errors must always be rectified before acknowledgement, otherwise the drive controller may be damaged.

Error messages can be acknowledged as follows:

- ☐ using the Bluetooth app
- ☐ digital input (can be programmed)
- ☐ using MMI (handheld controller)
- ☐ Automatic acknowledge function
- ☐ switch device off and on again
- ☐ via fieldbus (e.g. CANOpen, Profibus DP, EtherCAT)



CAUTION!

Possible change in electromagnetic properties. EMC change.

The programmed standard pulse frequency must not be reprogrammed by the user.

With the KOSTAL INVERTERapp, all KOSTAL frequency inverters of the INVEOR family with Bluetooth can be accessed conveniently via smartphone or tablet. The inverter app is available for Android and Apple.



INFORMATION

If the Ha.EN. (Hardware Enable) has been removed, the inverter will not display an error via the KOSTAL INVERTERapp. However, this can be seen from the fact that the yellow status LED on the inverter no longer lights up but flashes.



Red LED	Green LED	State
		Boot loader active (flashing in turn)
		Ready for operation (activate En_HW for operation)
		Operation / ready
		Warning
		Error
		Identification of motor data
		Initialisation
		Firmware update
		Bus error operation
		Bus error ready for operation

Img.8-1: LED flash codes

Key			
	LED off		LED on
	LED flashing		LED flashing quickly

<https://www.kostal-drives-technology.com/en-gb/download/>



Kostal operating manual EN in PDF format

9 Appendix

9.1 Copyright

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Subject to technical changes without notice.

9.2 Terminology/Glossary

Term	Explanation
Drill drift	Tool to release the bit or the drill chuck from the drill spindle
Drill chuck	Drill bit adapter
Drill head	Upper part of the geared drill
Drill sleeve	Fixed hollow shaft which runs in the drill spindle.
Drilling spindle	Shaft activated by the motor
Drilling table	Supporting surface, clamping surface
Taper mandrel	Cone of the drill or of the drill chuck
Spindle sleeve lever	Manual operation for the drill feed
Quick-action drill chuck	Drill holding fixture to be clamped manually.
Workpiece	Part to be drilled, part to be machined.
Tool	Drill bit, countersink, etc.

9.3 Change information operating manual

Chapter	Short summary	new version number
4.3.1 / 7	Information drilling depth, switching points	1.0.1
1	EMC categories	1.0.2
parts	Update wiring diagram	1.0.3
parts, 2	Updating spare parts + technical data	1.0.4
4.8.2	Disassembly with integrated drill drift	1.0.5
4..	Display - Language setting + Functions menu	1.0.6
3 ; 6.2	Interdepartmental transport Toothing of the spindle, Maintenance	1.0.7
parts	Frequency converter types	1.0.8
all	New frequency converter, Kostal ; New Electric and Electronic	1.0.9

9.4 Liability claims/warranty

Besides the legal liability claims for defects of the customer towards the seller, the manufacturer of the product, OPTIMUM GmbH, Robert-Pfleger-Straße 26, D-96103 Hallstadt, does not grant any further warranties unless they are listed below or were promised as part of a single contractual provision.

- Liability or warranty claims are processed at OPTIMUM GmbH's discretion either directly or through one of its dealers.
Any defective products or components of such products will either be repaired or replaced by components which are free from defects. Ownership of replaced products or components is transferred to OPTIMUM Maschinen Germany GmbH.
- The automatically generated original proof of purchase which shows the date of purchase, the type of machine and the serial number, if applicable, is the precondition in order to assert liability or warranty claims. If the original proof of purchase is not presented, we are not able to perform any services.
- Defects resulting from the following circumstances are excluded from liability and warranty claims:
 - Using the product beyond the technical options and proper use, in particular due to overstraining of the machine.
 - Any defects arising by one's own fault due to faulty operations or if the operating manual is disregarded.
 - Inattentive or incorrect handling and use of improper equipment
 - Unauthorized modifications and repairs
 - Insufficient installation and safeguarding of the machine
 - Disregarding the installation requirements and conditions of use
 - atmospheric discharges, overvoltage and lightning strokes as well as chemical influences
- The following items are also not subject to liability or warranty claims:
 - Wearing parts and components which are subject to a standard wear as intended such as e.g. V-belts, ball bearings, illuminants, filters, sealings, etc.
 - Non reproducible software errors
- Any services, which OPTIMUM GmbH or one of its agents performs in order to fulfil any additional warranty are neither an acceptance of the defects nor an acceptance of its obligation to compensate. These services neither delay nor interrupt the warranty period.
- The court of jurisdiction for legal disputes between businessmen is Bamberg.
- If any of the aforementioned agreements is totally or partially inoperative and/or invalid, a provision which nearest approaches the intent of the guarantor and remains within the framework of the limits of liability and warranty which are specified by this contract is deemed agreed.

9.5 Storage

ATTENTION!

Incorrect and improper storage might result in damage or destruction of electrical and mechanical machine components.

Store packed and unpacked parts only under the intended environmental conditions.

Follow the instructions and information on the transport box.



- ☐ Fragile goods
(Goods require careful handling)
- ☐ Protect against moisture and humid environment
► Environmental conditions on page 18
- ☐ Prescribed position of the packing case (Marking of the top surface - arrows pointing to the top)
- ☐ Maximum stacking height
Example: not stackable - do not stack further packing case on top of the first one.



Consult Optimum Maschinen Germany GmbH if the machine and accessories are stored for more than three months or are stored under different environmental conditions than those specified here.

9.6 Advice for disposal / Options of reuse:

Please dispose of your equipment in an environmentally friendly manner, by not placing waste in the environment but in a professional manner.

Please do not simply throw away the packaging and later the disused machine, but dispose of both in accordance with the guidelines laid down by your city council/local authority or by an authorised disposal company.

9.6.1 Decommissioning

CAUTION!

Used devices need to be decommissioned in a professional way in order to avoid later misuses and endangerment of the environment or persons.



- Unplug the power cord.
- Cut the connection cable.
- Remove all operating materials from the used device which are harmful to the environment.
- If applicable remove batteries and accumulators.
- Disassemble the machine if required into easy-to-handle and reusable assemblies and component parts.
- Dispose of machine components and operating fluids using the intended disposal methods.

9.6.2 Disposal of new device packaging

All used packaging materials and packaging aids from the machine are recyclable and generally need to be supplied to the material reuse.

The packaging wood can be supplied to the disposal or the reuse.

Any packaging components made of cardboard box can be chopped up and supplied to the waste paper collection.

The films are made of polyethylene (PE) and the cushion parts are made of polystyrene (PS). These materials can be reused after reconditioning if they are passed to a collection station or to the appropriate waste management enterprise.

Only forward the packaging materials correctly sorted to allow direct reuse.

9.6.3 Disposal of the old device

INFORMATION

Please take care in your interest and in the interest of the environment that all component parts of the machine are only disposed of in the intended and admitted way.



Please note that the electrical devices comprise a variety of reusable materials as well as environmentally hazardous components. Please ensure that these components are disposed of separately and professionally. In case of doubt, please contact your municipal waste management. If appropriate, call on the help of a specialist waste disposal company for the treatment of the material.

9.6.4 Disposal of electrical and electronic components

Please make sure that the electrical components are disposed of professionally and according to the statutory provisions.

The device is composed of electrical and electronic components and must not be disposed of as household waste. According to the European Directive 2011/65/EU regarding electrical and electronic used devices and the implementation of national legislation, used power tools and electrical machines need to be collected separately and supplied to an environmentally friendly recycling centre.

As the machine operator, you should obtain information regarding the authorised collection or disposal system which applies for your company.

Please make sure that the electrical components are disposed of professionally and according to the legal regulations. Please only throw depleted batteries in the collection boxes in shops or at municipal waste management companies.

9.6.5 Disposal of lubricants and coolants

ATTENTION!

Please imperatively make sure to dispose of the used coolant and lubricants in an environmentally compatible manner. Observe the disposal instructions of your municipal waste management companies.



INFORMATION

Used coolant emulsions and oils should not be mixed since it is only possible to reuse oils without pre-treatment when they have not been mixed.

The disposal instructions for used lubricants are made available by the manufacturer of the lubricants. If necessary, request the product-specific data sheets.



9.7 Disposal via municipal collection facilities

Disposal of used electrical and electronic components

(Applicable in the countries of the European Union and other European countries with a separate collecting system for those devices).

The sign on the product or on its packing indicates that the product must not be handled as common household waste, but that it needs to be disposed of at a central collection point for recycling. Your contribution to the correct disposal of this product will protect the environment and the public health. Incorrect disposal constitutes a risk to the environment and public health. Recycling of material will help reduce the consumption of raw materials. For further information about the recycling of this product, please consult your District Office, municipal waste collection station or the shop where you have purchased the product.



9.8 Product follow-up

We are required to perform a follow-up service for our products which extends beyond shipment.

We would be grateful if you could send us the following information:

- ☐ Modified settings
- ☐ Any experiences with the geared drill which might be important for other users
- ☐ Recurring malfunctions

Optimum Maschinen Germany GmbH

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EC Declaration of Conformity

according to Machinery Regulation 2023/1230 Annex V Part A

The manufacturer / distributor Optimum Maschinen Germany GmbH
Dr.-Robert-Pfleger-Str. 26
D - 96103 Hallstadt, Germany

hereby declares that the following product

Product designation: Drilling machine

Type designation: DH45V

fulfils all the relevant provisions of the Machinery Regulation specified above and the additionally applied directives (in the following) - including the changes which applied at the time of the declaration.

Description:

Manual drilling machine with Kostal frequency inverter

This machine is not subject to the requirements of the EN 61000-3-2 standard for the emission of harmonics. This machine is intended for commercial use only.

The following additional EU Directives have been applied:

EMC Directive 2014/30/EU ; Restriction of the use of certain hazardous substances in electrical and electronic equipment 2015/863/EU

The following harmonized standards were applied:

EN 12717: 2009-07 Machine tools - Safety - Drilling machines

EN 60204-1: 2019-06 Safety of machinery - Electrical equipment of machines - Part 1: General requirements

EN 13849-1: 2016-06 Safety of machinery - Safety related parts of controls - Part 1: General design principles

EN 13849-2: 2013-02 Safety of machinery - Safety related parts of controls - Part 2: Validation

EN ISO 12100: 2011-03 Safety of machinery - General principles for design - Risk assessment and risk reduction

EN 61000-3-3: 2023-02 Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection

Name and address of the person authorized to compile the technical file:

Kilian Stürmer, phone: +49 (0) 951 96555 - 800



Kilian Stürmer (CEO, General Manager)
Hallstadt, 2024-11-12

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